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ANNUAL REPORT
OF THE
SURGEON GENERAL *of the*
PUBLIC HEALTH SERVICE
of the UNITED STATES
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1940



UNITED STATES
GOVERNMENT PRINTING OFFICE
WASHINGTON : 1941

Public Health Service

LETTER OF TRANSMITTAL

FEDERAL SECURITY AGENCY,
OFFICE OF THE ADMINISTRATOR,
Washington, January 3, 1941.

SIR: In accordance with United States Code, title 42, section 4, I have the honor to transmit herewith the report of the Surgeon General of the Public Health Service for the fiscal year 1940.

Respectfully,

PAUL V. McNUTT,
Administrator.

THE SPEAKER OF THE HOUSE OF REPRESENTATIVES.

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ANNUAL REPORT OF THE SURGEON GENERAL OF THE PUBLIC HEALTH SERVICE

UNITED STATES PUBLIC HEALTH SERVICE,
Washington, D. C., October 14, 1940.

SIR: In accordance with the act approved July 1, 1902 (U. S. C., title 42, sec. 4), I have the honor to submit for transmission to Congress the sixty-ninth annual report of the transactions of the United States Public Health Service for the fiscal year ended June 30, 1940, which is the one hundred and forty-second year of this organization's existence.

The first year of operation under the Federal Security Agency has been completed. This short experience has demonstrated the desirability of grouping the Public Health Service with other major governmental agencies dealing with the related fields of social welfare and education. Harmonious relationships have been established with other constituent units of the Agency and further experience undoubtedly will show the way toward increasing efficiency in dealing with many matters of common concern.

At the end of the fiscal year, a further and gratifying coordination of health activities was provided by the transfer of the Food and Drugs Administration to the Federal Security Agency and by the transfer to the jurisdiction of the Public Health Service of St. Elizabeths Hospital and of Freedmen's Hospital.

PUBLIC HEALTH IN THE NATIONAL DEFENSE PROGRAM

Inauguration of the national defense program forecasted future expansion of the public health aspects of national defense. The concept is gaining acceptance that, in preparedness efforts, it is of importance to conserve and develop the Nation's manpower in the interest not only of military efficiency but also of industrial productivity and of reducing the financial burden to the Nation occasioned by preventable sickness and death. On June 14, 1940, it was recommended to the President that a coordinator of health and medical problems be appointed under the National Defense Council.

A survey was made of strategic drugs, of which opium and quinine are the most important. With the cooperation of the importers, reserve stocks of opium were built up to meet a 3-year demand. Through similar cooperation, large supplies of cinchona bark were imported. In addition, the joint Army-Navy Munitions Board, following a recommendation by the Public Health Service, purchased a considerable supply of quinine sulfate. The usual source of cinchona bark has been from the Dutch East Indies, although this material originally came from South America. A special expert was employed to make a survey of the actual and potential amounts of cinchona bark

which could be secured from South America. It was found that even though the price of the bark were double the present price, less than a half year's supply could be secured from all of South America.

The National Institute of Health undertook studies of the physiological problems associated with high altitude flying and rapid compression at the request of the Navy Department. The Institute also advised with the Army and Navy authorities concerning standard immunization procedures for the military forces. The cooperation of the International Health Division of the Rockefeller Foundation was secured in the manufacture of 150,000 doses of yellow fever vaccine for which there would be an urgent need in the event that yellow fever spreads from South America to Puerto Rico, the Canal Zone, or the southern United States. Plans were made for the continuing production of yellow fever vaccine on a large scale at the Rocky Mountain Laboratory, Hamilton, Mont.

Active cooperation was given to the Army in protecting the health of troops during the spring and summer maneuvers. Efforts were directed toward the active control of venereal disease infection, the sanitation of food establishments, protection of milk and water supplies, and control of communicable diseases.

HEALTH LEGISLATION

No health legislation of importance was passed during the year. The Stream Pollution Bill, to which reference has been made in previous annual reports, passed both the House and the Senate, but failed to become a law because of disagreement between the two houses as to whether or not Federal abatement of new pollution should be authorized. On January 30, 1940, the President sent a special message ¹ to the Congress recommending the passage of a bill to provide for the construction of community hospitals, especially in rural areas and in areas suffering from severe economic distress. Under the President's plan, the hospitals would be constructed by the Federal Government and leased to the municipalities on condition that upkeep and maintenance would be provided by the community. The President's proposal was modified in the Senate to provide for construction of hospitals by the Federal Government during the first year (\$10,000,000 were authorized for this purpose), and in succeeding years for Federal aid to communities under a variable grant formula for the construction of hospitals to be owned and operated by the community, with Federal aid towards maintenance during the first 5 years. Because of the pressure of defense legislation, no action was taken on the bill in the House. The National Health Bill, S. 1620, to which reference was made in last year's report, received no further consideration by the Senate. Hearings were held in the Senate on a bill, S. 3125, to authorize research by the Public Health Service relating to the cause, diagnosis, and treatment of the common cold, influenza, and pneumonia.

PUBLIC HEALTH SERVICE ACTIVITIES

Among the far-flung activities of the Public Health Service, no one event stands out as of transcendent importance. Cooperative health

¹ See Appendix B.

activities with the States continued both in venereal disease control and general health services. Research continued under the National Cancer Act in various phases of the complicated cancer problem, with increasing cooperation of many scientific institutions in the country.

A study was completed by the National Institute of Health of lead arsenate spray residues on fruit; and a report was completed in which it will be recommended that the previous tolerances permitted by the Food and Drugs Administration can be increased to approximately double the existing tolerances without damage to health.

Outstanding progress was made in connection with knowledge of three important diseases. For the first time it was found that the common house mouse harbors the virus of lymphocytic choriomeningitis, and that the disease without nervous symptoms appears to be widespread. A strain of poliomyelitis was introduced successfully into the eastern cotton rat and thence into white mice. Heretofore the monkey has been the only laboratory animal susceptible to this disease. The discovery that the white mouse contracts the disease with characteristic symptoms makes possible a great expansion of laboratory research in various aspects of the poliomyelitis problem.

During the year an egg culture vaccine was developed which offers real hope for immunization against epidemic typhus fever. The importance of this discovery is accentuated because typhus fever traditionally has become epidemic in war-torn countries. A supply of this vaccine has been sent to Hungary and Rumania for test under field conditions. Funds should be made available to enable the production of a large quantity of this vaccine both for further experimental use in Europe and Africa and, if typhus becomes epidemic in the Western Hemisphere, for its widespread use here.

The war in Europe first intensified the pressure of immigration to the United States and later shut off the influx. Twelve Service officers were on duty in the various American consulates. Two officers were assigned at the request of the American Red Cross as sanitary advisers to Finland during the Finnish war. One officer made a study of health and food conditions for the Red Cross in Norway soon after the German occupation. A number of officers were assigned at the request of the State Department for the inspection of prison camps both in Germany and in France.

Many other activities too numerous to mention here are discussed in the reports of the several divisions.

FEDERAL-STATE COOPERATION

An important function of the Public Health Service is the administration of the cooperative public health programs under the Social Security Act and the Venereal Disease Act, including the provision of technical and advisory service to State health agencies.

STATE AND LOCAL HEALTH SERVICES

Since the social security program became effective, a total of \$36,833,000 has been appropriated for grants-in-aid to the States. During this fiscal year, additional impetus was given to the cooperative health program by the amendments of 1939 to the act, which in-

creased the amount authorized for grants-in-aid to the States under title VI from \$8,000,000 to \$11,000,000 annually. Under this authorization, an additional \$1,500,000 became available to the States, bringing the total appropriation for 1939-40 to \$9,500,000. These additional funds were utilized principally in strengthening or establishing special programs for pneumonia, tuberculosis, cancer, malaria, dental hygiene, and industrial hygiene. A comparison of the budgets for these six activities in September 1939 with those in June 1940 shows an increase of 62 percent.

The total amount of money available from all sources in those health jurisdictions where Federal funds were budgeted was \$83,790,782 for the fiscal year 1940. This represents an increase of \$32,714,421 over similar tabulations for last year. The greatest proportion of this increase is due to the fact that certain large cities now participating in cooperative health programs are submitting their budgets to the Public Health Service. With this increase in the amount of funds available for public health work, the proportion of title VI funds to the total amount from all sources dropped from 16 percent in 1939 to 12.9 percent in 1940.

The desirability of qualified personnel, of tenure of office, and of other advantages of a well regulated system of personnel administration have been pointed out in previous reports. Under present regulations covering the allotment and payment to States of title VI funds, the States are required to submit, as a part of the State plan, a "plan for a merit system of personnel administration, as is now in effect or may hereafter be adopted, applicable to any State or local health personnel." Under a system of personnel administration based on merit, public health may become a career service in State and local health departments. Further, the system promotes a higher standard of personnel qualifications and should result in important advances in public health.

Under the provisions for the technical training of public health personnel, 1,142 persons received training during the year. Although this number is somewhat smaller than that of last year, a preliminary study of trainees over a 4-year period shows that the qualifications, as judged by the proportion who have had previous formal public health training, are improving.

During the past year, 1,577 counties were receiving some form of full-time health service; 655 counties were served by single county units; 356 counties were under 122 local district health units; and 566 counties were included in 106 State supervisory health districts. During the 4½ years that the Social Security Act has been operating, the number of single county health units has increased 34.8 percent and the number of counties served by local district health units has increased 187.1 percent. The number of counties receiving full-time health services is now greater than at any time in the past.

Consultation service to the States on general programs and special health problems arising from the administration of title VI and venereal disease funds has been furnished by the six district offices and by the central office in Washington. During the year the sixth district, with headquarters in San Juan, was established for the coordination of health activities in Puerto Rico and the Virgin Islands.

During the calendar year, requests were received from the States for certification of 1,806 water supplies used by common carriers. Of

the water supplies certified, 65 percent were given favorable certificates, 30 percent were issued provisional certificates, 3 percent were prohibited for use, and 2 percent remained unreported upon at the end of the year. Further related activities include the sanitary inspection of vessels listed as interstate carriers; 1,130 such vessels were inspected during the year.

The national defense program will bring about concentrations of population in military and industrial areas. The basic health organization has been developed in most of these areas but, in addition, the Public Health Service should be enabled by special appropriation to augment local and regional services in various ways, including the employment of personnel who would operate on special local assignments or through mobile units.

In all likelihood, defense activities also will increase the internal shift of the population. This in turn will tend to aggravate the health problems associated with transiency. For the most part transients are persons of low income who fall into the dependent class when overtaken by illness. Unfortunately, settlement laws and social practices prevent their participation in whatever social and relief services the local communities afford. A relatively small but properly safeguarded Federal fund, available for use on a selective basis, would materially aid in meeting the health and medical care problems of persons in the process of migration.

The marked expansion of the public health organization of this country during recent years is represented, for the most part, by personnel trained in the several elements of public health service. The most pressing need now is for facilities which will enhance the usefulness of personnel in public health positions. Funds should be made available to aid in the construction of well-equipped health centers for the efficient performance of needed public health services. Studies have also shown that small general hospital units are needed in many areas remote from centers of population. Legislation pending before the Congress, if enacted, would be an important initial step toward meeting the need for health centers and for hospitals, especially in rural and economically depressed areas.

In its relations with the States, the Public Health Service at present operates through five regional offices for the continental United States and an additional office which serves Puerto Rico and the Virgin Islands. Travel costs could be reduced and general administration would be facilitated by the establishment of a sixth district office on the continent. This office would serve certain States in the plains and the great basin now served by districts III and IV, the headquarters of which are located, respectively, at Chicago and New Orleans.

Typhus fever and plague are endemic diseases which merit more attention than has been possible with available funds. Typhus fever is confined very largely to the southern States, and the rat has been demonstrated to be the animal reservoir of the disease. A material reduction in the rat population, if sustained, can be relied upon to control typhus fever. Plague has become established in the wild rodents of the western States. Eradication of these rodents has not proved feasible over a wide area. The distribution of rodent plague must be carefully watched and aggressive steps should be taken whenever there seems any likelihood of its becoming established among the rats of urban areas or thickly settled rural communities. Both typhus

fever and plague have many interstate and international implications; hence their control cannot be delegated entirely to the States; the Public Health Service should be given a reasonable annual appropriation for the maintenance of an organization to supplement the activities of those States where the diseases are endemic.

VENEREAL DISEASE ACTIVITIES

After 2 years of work under the Venereal Disease Control Act, the number of syphilis cases reported seems to have reached or passed the peak. In areas where syphilis has been attacked vigorously it has begun to recede. This indicates that the large reservoir of untreated cases has been substantially reduced. Because of the proposed military conscription, the great increase in industrial employment, and the operation of State marriage laws, routine blood testing will be accelerated during the next year. This may result in some increase in the total number of cases of syphilis discovered and put under treatment. Important as it is to discover all cases of syphilis, the major objective should be to discover more early infectious cases. In this way foci of infection can be stamped out.

A second major factor in control is the problem of case holding. We must make sure that infected persons complete a full schedule of treatment, sufficient not only for their protection but for that of the community. Progress in this direction is indicated by the fact that the proportion of individuals who remain under treatment until they have received the minimum required therapy has increased from 15 percent to 58 percent.

Existing diagnostic and treatment facilities have been expanded from 1,750 clinics and dispensaries for the treatment of venereal diseases as of July 1, 1938, to 2,900 as of July 1, 1940. Private physicians have been able further to supplement these treatment facilities for the medically indigent by utilizing laboratory services and drugs provided by health authorities. The number and volume capacity of laboratories for the detection of venereal diseases have increased. Today there are over 2,000 laboratories performing tests for venereal disease, three-fourths of which are privately owned and operated. The number of laboratory tests reported increased from 5,500,000 in 1939 to 9,000,000 in 1940. Similarly, the number of tests for gonorrhea increased from 600,000 in 1939 to 1,100,000 in 1940. Sales of arsenical drugs for the treatment of syphilis have increased from 10,700,000 doses in 1938 to 12,400,000 in 1939. Thirty percent of the arsenicals furnished by State health departments are given to private physicians for use in the treatment of indigent or part-pay patients.

The introduction of the sulfonamide compounds has revolutionized the treatment of gonorrhea. The new therapy shortens the period of communicability of the disease. Recent studies conducted by the Public Health Service in cooperation with the American Neisserian Medical Association indicate that sulfathiazol is the most effective drug yet used in the treatment of gonorrhea. Further co-operative study of the newer sulfonamide compounds is progressing rapidly. It is anticipated that real progress in the mass control of gonorrhea will be made during the coming year.

Another development of great promise is the intensive 5-day treatment of syphilis. Through cooperative studies in many centers this

method is being given a thorough trial. The Public Health Service is participating in these studies. The Cooperative Clinical Group, organized some 10 or 12 years ago, has continued to point the way to standardized syphilis treatment regimens and to improved control methods.

Venereal disease has been, and still is, one of the principal causes of disability in military as well as in civilian populations. In order to develop an effective program for the prevention and control of venereal disease, the Public Health Service is cooperating with the medical corps of the Army and Navy and with State and local health departments.

To assist in directing health programs along the most effective lines, the Public Health Service has continued to assign to States and municipalities a number of trained medical officers in a consultative capacity. Postgraduate training of additional personnel has been continued. A stimulating conference of health officers of the southern States was held in Atlanta, Ga. The conference adopted some 40 resolutions for future guidance, dealing with diagnosis, treatment, control, and legislation with reference to venereal diseases.

Cooperation with the Civil Service Commission in the study of medical records of syphilitic applicants to determine their physical eligibility for employment has continued. Through a greater realization by labor and industry that syphilis costs lives and money, campaigns have been organized in many leading industries for finding and treating this disease. An integral part of these programs has been the provision of treatment to workers without interruption of employment. Education of the public has continued to play an important role in venereal disease control.

During the year, the Venereal Disease Medical Center at Hot Springs, Ark., examined 4,662 persons representing 43 States and the District of Columbia. Of this number, 1,512 were admitted for treatment of syphilis and 682 for gonorrhea. The Medical Center also undertook a comparative study of the toxicity of neoarsphenamine and sulfarsphenamine. Training was afforded to 19 physicians, 3 nurses, and 1 bacteriologist.

The Venereal Disease Research Laboratory has continued investigations concerning the treatment and laboratory diagnosis of syphilis and gonorrhea. As a result of the expansion of serodiagnosis of syphilis, a branch laboratory was opened at San Francisco to serve the western area of the country. Further improvement was made in the accuracy of serologic tests in State and local laboratories.

It is recommended (1) that the national syphilis control program be carried through energetically; (2) that, with the development of the newer methods for attacking gonorrhea, major emphasis be placed on applying this knowledge to the control of gonorrhea en masse; and (3), above all, that every effort be made to speed up the mass control of both diseases, particularly in military and industrial defense areas.

COOPERATION WITH OTHER AGENCIES

Federal Agencies.—The Ohio River Pollution Survey has been continued as a cooperative investigation between the Public Health Service and the United States Army Corps of Engineers under the general

direction of the Ohio River Committee. In April 1940 an interim report was submitted to the Committee summarizing laboratory findings and sources of pollution data and hydrometric studies indicating the sanitary condition of the streams, and setting forth recommendations for the restoration of these streams to the condition for which they seemed best suited.

The Service has continued to furnish supervision of health projects of the Work Projects Administration. However, a further reduction in the allotment for the fiscal year 1940 made it necessary to reduce the supervisory personnel and required that State health departments assume greater responsibility in providing technical supervision. The health programs carried on under the Work Projects Administration include community sanitation, malaria control, and the sealing of abandoned coal mines.

In addition, various other cooperative services have been extended to the Department of State, the Department of Justice, the United States Army, the United States Navy, the Civil Service Commission, the Federal Employees' Compensation Commission, the Federal Trade Commission, the Interstate Commerce Commission, the Farm Security Administration, the Food and Drugs Administration, the Office of Indian Affairs, the National Forest Service, the Civil Aeronautics Authority, the Tennessee Valley Authority, the United States Housing Authority, the Civilian Conservation Corps, the National Youth Administration, the Procurement Division of the Treasury Department, the District of Columbia, and numerous other Federal agencies.

For many years the Public Health Service has fostered the development of cooperative plans with other units of the Federal Government, in connection with which the facilities of the Service are utilized by the cooperating agencies. Increasing opportunities for this type of cooperative endeavor occur as health commands more attention on the part of agencies whose primary interest lies in another field. The absence of a satisfactory method for reimbursement for such services seriously interferes with their logical development across bureau and division lines. As a result, agencies are often compelled to establish health units of their own, whereas they would much prefer utilizing the resources of an agency organized solely to perform health services. It is recommended that sufficient funds be made available to the Public Health Service for the employment and training of personnel for this interdepartmental service.

Acknowledgment of reciprocal assistance.—In connection with services rendered by the Public Health Service in cooperative health work with other agencies, grateful acknowledgment must be made of the reciprocal aid received not only from other Federal units, but also from State and local health departments, other governmental agencies, scientific and educational institutions, foundations, hospitals, professional societies, and civic organizations. These cooperative activities are mentioned elsewhere in this report.

PAN AMERICAN HEALTH RELATIONS

Pan American relations in the field of public health have shown constant development both in cordiality and effectiveness throughout the years. This is largely due to the work of the Pan American

Sanitary Bureau which has shown unprecedented growth during the past 2 years.

As in the past, officers of the Public Health Service have served with the Pan American Sanitary Bureau in Washington, D. C., and in the field. Officers of the Service act as director and assistant director of the Bureau; others are members of the Bureau's committees on nutrition, malaria, and sanitary codes. Four officers of the Service continued to act as traveling representatives of the Bureau. At the request of the health authorities, they have visited Argentina, Bolivia, Brazil, Chile, Colombia, the Dominican Republic, Ecuador, Haiti, Panama, Paraguay, Peru, Uruguay, and Venezuela, and have given advice and assistance in health administration, organization, and other special problems. Other Service officers cooperated with the Pan American Sanitary Bureau in making hospital surveys in Peru and in El Salvador; in the control of a poliomyelitis epidemic in Colombia; and in the investigation of an outbreak of plague in the State of Aragua, Venezuela.

The Fourth Pan American Conference of National Directors of Health was held in Washington, D. C., April 30 to May 8, 1940. The conference offered an excellent opportunity for the interchange of impressions regarding the numerous and important problems confronting the health authorities of the various republics. The delegations from the several countries were larger than at preceding conferences and a number of important reports were presented at all of the sessions. The United States delegation included a number of Public Health Service officers.

The Eighth American Scientific Congress was held in Washington, D. C., May 10-18, 1940. The Section on Medicine and Public Health of this conference, under the chairmanship of the Surgeon General of the Public Health Service, was well attended and a number of valuable papers were presented.

At the request of the State Department and the Interdepartmental Committee on Cooperation with the American Republics the Service has also participated in the activities of the joint Committee on Medicine and Allied Sciences for the promotion of cultural relations with the American Republics. The Interdepartmental Committee has expressed the opinion that there has been no form of cooperation in which the practical results have been more effective or more productive of goodwill throughout the Americas than the joint activities of the Pan American Sanitary Bureau and the Public Health Service.

In connection with these cooperative activities, the Public Health Service has provided internships in marine hospitals for seven medical students from Chile and from Ecuador. The plan for interne training in selected marine hospitals of medical and dental internes from South American countries is being extended, similar opportunities having been offered through the national health authorities to graduates in Brazil, Colombia, Cuba, Guatemala, and Honduras.

THE NATIONAL INSTITUTE OF HEALTH

Research in the National Institute of Health has been stimulated by the completion of the laboratory buildings near Bethesda, Md., and at Hamilton, Mont. During the past quarter century this institution

has had a distinguished record for its contributions to medical and public health knowledge. Now, with an unequalled physical plant and with substantial resources, the Nation should expect even better results.

The following sections summarize briefly the research accomplishments of the National Institute of Health during the fiscal year 1939-40.

BIOLOGIC PRODUCTS

Since the adoption in 1939 of uniform methods of testing pneumococcic typing serums, much greater uniformity in potency and in the absence of cross reactions has been observed in these important diagnostic aids in cases of pneumonia. Further studies on the effect of artificial temperatures upon nearsphenamines having less than 1.5 percent moisture indicate marked improvement in the stability of this commercial product. A test for standardizing the immunizing potency of antirabic vaccines has been developed. Dried botulinus antitoxins, types A and B, have been prepared to be used as official standards, replacing glycerinated products which have been in use for several years. Sufficient purified protein derivative of the tubercle bacillus has been prepared to supply a United States standard and is being tested. As of June 30, 1940, 69 establishments, 15 of which were foreign, held licenses to engage in the sale of 168 biologic preparations.

CHEMICAL AND PHARMACOLOGICAL STUDIES

Studies of the starch-digesting enzymes of the *Aerobacillus* group of micro-organisms have demonstrated that the amylase of at least two of the group can be concentrated and purified by acetone precipitation. In fact, the amylase of *Aerobacillus macerans* was purified to the degree that the preparations obtained in the study digested about 500 times their weight of starch. These and other findings have a useful purpose in nutritional investigations in that they shed additional light upon the biochemistry of the *Aerobacillus* group. In the same field of research, a much simpler method for measuring terminal groups of starches and dextrans has been developed.

The ratio of protein to selenium in the diet has been found to have a direct relationship to chronic selenium poisoning. Cirrhosis of the liver, anemia, and effusions, which result when the diet contains 10 parts per million of selenium, may all be prevented by including in the diet enough protein to bring the protein-selenium ratio up to an optimum level.

In chemotherapy studies, three series of new active compounds entirely different from sulfanilamide were obtained. These are derivatives of arsenic, phosphorus, and nitrobenzoic acid, many of which have not been described heretofore. In addition, it was demonstrated that the sulfanilamide radical is not stable, according to general belief. The molecule broke down rapidly when exposed to oxidizing agents, including ultraviolet light.

NUTRITIONAL PROBLEMS

The nutritional status of the population is directly related to its health and vitality. Improvements in diagnostic methods made dur-

ing the year indicate that it may be possible soon to formulate a system of physiological, chemical, and functional tests of nutritional status which may be applied on a broad public health scale.

Studies on riboflavin deficiency were continued, with increased attention to the symptomatology of the deficiency and to the human requirements of nicotinic acid and riboflavin. Interstitial keratitis was found to be one of the manifestations of riboflavin deficiency. In a cooperative study with the University of Georgia Medical School and the Milbank Memorial Fund, cases of keratitis of unknown origin and in which treatment had been unsatisfactory, rapidly improved with the use of riboflavin.

The Public Health Service continued to supervise the mineral analysis of Tennessee and Alabama foodstuffs. The work is now done in the new nutrition laboratory of the Tennessee Valley Authority. Consultant and advisory services were extended to the nutrition programs of various State health departments.

INDUSTRIAL HYGIENE

Demands for consultant services and investigations in industrial hygiene are increasing and will undoubtedly continue to do so because of the expanding industrial defense program. Of special importance are the medical and engineering control measures to prevent health hazards in the munitions, airplane, tool manufacturing, and chemical industries.

The present demands of national defense find the Public Health Service and cooperating agencies in a better position than ever before to cope with the health problems of a rapidly expanding industrial program. Efforts of the past 4 years to develop industrial hygiene units in various State and local health departments have borne fruit. Today, some 40 units are in operation in 29 States, 9 cities, and 2 Territories. The personnel of these units are actively developing programs of practical control of health hazards in industry, and are coordinating industrial hygiene services with other phases of the State and local public health programs.

Among the many laboratory and field investigations in industrial hygiene which have been completed during the year, the following may be cited as of immediate value in defense activities:

A method for assessing the effects of fatigue upon truck drivers in the motor-transport industry has been devised and has proved effective in field tests. By means of a battery of psychological and physiological tests, it was found that the functional efficiency of drivers declines as the hours of work increase. A composite score from these tests makes it possible to establish the psychophysiological status, or characteristic fatigue pattern, of individuals.

Increased demands for manganese and its processing in the United States add significance to a recently completed investigation of chronic manganese poisoning, including extensive clinical and laboratory studies. Practical measures for medical and engineering control of this condition have been developed and made public. Similar studies on other heavy metals, such as lead and mercury, have been completed.

An oxygen inhalation apparatus for the prevention of compressed air illness has been developed and tried out in actual practice with encouraging results. The administration of a mixture of helium and

oxygen has proved effective in the relief of tubal and sinus block as they occur in compressed air workers.

The increasing importance of aviation has focused attention upon the effects of rarefied atmospheres upon the human organism. Work in this field has been extended in order to clarify the problems of flight at very high altitudes and to improve existing methods and apparatus for the administration of oxygen.

The efficiency and health of the industrial worker is affected not only by occupational hazards but also by nonindustrial sickness and injuries. For 18 years the Public Health Service has been collecting and analyzing the sickness reports of a group of cooperating industrial sick benefit associations. Morbidity trends for this extensive period indicate that diseases of the circulatory system, including heart diseases, appendicitis, and nonindustrial injuries have been increasing in this group of some 170,000 male employees.

Significant findings, showing the relation of economic status to sickness among industrial workers, have been reported. In the soap industry, office workers experienced a low frequency of disabling sickness, while soap handlers and processing laborers experienced the highest. In the slaughtering and meat packing industry, Negro male workers experienced an excess in the frequency of disabilities, but when their occupations were in categories similar to the occupations of white male workers, the Negro excess decreased.

A study of pneumoconiosis among mica and pegmatite workers has been completed and published. Equipment and practices which have effectively reduced dust exposure to safe limits in comparable operations were described.

The number of dermatoses investigations doubled over that of the preceding year. The outstanding discovery of the current year was that an oxidant used in rubber gloves causes leukoderma. This is the first known chemical cause of the disease.

INFECTIOUS DISEASES

Rickettsial diseases.—The rickettsioses continued to occupy a conspicuous place in studies of infectious diseases. Typhus fever and Rocky Mountain spotted fever are the two rickettsial diseases endemic in the United States. A third member of this group, American "Q" fever, has been found to be identical with Australian "Q" fever. It is present in this country, but little is known about its extent.

The yolk sac of the developing chick embryo has been used in the preparation of highly refined rickettsial vaccines which have satisfactorily protected laboratory animals against Rocky Mountain spotted fever, epidemic typhus fever, boutonneuse fever, and American "Q" fever. The Rocky Mountain spotted fever vaccine has been used experimentally in man, and 40 liters of the epidemic typhus vaccine have been sent to Hungary and Rumania for test use in refugee populations.

Virus diseases.—During the past year, the virus of poliomyelitis was successfully transmitted to the eastern cotton rat and to the white mouse. In addition, a protection test to determine the presence or absence of poliomyelitis antibodies in human serums was developed and has proved satisfactory in preliminary tests.

Earlier investigations which showed that house mice are an effective reservoir for the transmission of lymphocytic choriomeningitis to man have been confirmed. A systemic type of the disease exists, without involvement of the central nervous system. The symptoms resemble those of influenza, but the virus may be recovered from the patient's blood.

Pneumonia.—A preparation suitable for use in the treatment of human beings has been obtained by the isolation of pneumococcus antibody from immune rabbit plasma. Antigenic polysaccharides have been prepared for the 31 recognized types of the pneumococcus, and are being used in experiments to determine the value of these substances as immunizing agents against pneumonia in human beings. Approximately 5,000 persons have been immunized and skin tests have been made in an experiment to test the hypothesis that the high incidence of pneumonia occurs among persons who fail to respond to the immunizing agent, and, conversely, that low incidence occurs among those who respond well.

Malaria.—The perennial fight against malaria went forward without abatement but without yielding outstanding results. Especial attention was given to parasitology and immunology, studies of anopheline biology, malaria therapy, mosquito control, and education of both civic and professional groups.

Medical control of malaria rests chiefly upon the use of quinine and two synthetic drugs. None of these is satisfactory in prophylaxis or in the prevention of relapses. Since it is particularly important that the United States be independent of quinine, which can be obtained only from foreign sources, researches are being conducted in the synthesis of new drugs likely to be effective in the prevention and cure of malaria. This work is done in cooperation with the National Research Council.

At the request of the State Department, three medical officers of the Service were detailed to investigate an outbreak of a malignant disease said to exist in southwest China along the new China-Burma Road and to determine the possible menace to the United States incident to the spread of the disease along this important highway.

The disease was found to be an epidemic of malaria spread by the *Anopheles minimus* as the principal vector. Control measures were instituted and a group of Chinese physicians accompanying the commission were instructed in the methods of making malaria and anopheline surveys and in the means for the control of the disease. At the termination of the work of the Public Health Service Commission, the Rockefeller Foundation and the Yunnan Research Group took over the research activities, and the recently trained Chinese physicians were designated as the malaria control unit for the Central Health Administration in order to carry on control work in the infected areas.

Other diseases.—Officers of the Public Health Service continued to study the measures employed by the Brazilian Department of Public Health in the control of yellow fever in Brazil. Knowledge of these measures and of their effectiveness are of especial importance to the United States because of the proximity of yellow fever areas to these shores. In cooperation with the Rockefeller Foundation, yellow fever vaccination clinics were held in Texas in order to build up a reserve of immune medical and technical personnel.

Thirty-seven cases of Weil's disease were diagnosed by agglutination tests; 6 of the cases terminated fatally. The high fatality rate, the fact that the disease has been found in 14 States, and that the animal reservoir includes both dogs and rats, add to the public health significance of this infection.

A survey of the leprosy problem in the continental United States leads to the opinion that the disease has been present in this country for at least 150 years. At the present time it is neither materially increasing nor declining. The work of the Public Health Service on leprosy in Hawaii comprises bacteriological studies and the treatment of patients. Thiamin chloride was again used successfully during the year in the treatment of the painful neuritis so commonly encountered among leprosy patients.

HEART DISEASE STUDIES

Clinical, laboratory, and epidemiological studies of heart diseases were continued throughout the year. Thus far, the work of the Public Health Service on rheumatic fever has failed to elicit proof that a virus is concerned in the causation of this disease. Further studies of the complement-fixation reaction have demonstrated the fallibility of this technique in the diagnosis of rheumatic fever.

A study of mortality statistics in the United States Registration Area for the years 1930-36 as compared to 1922-29 indicates a reduction of 27.6 percent in deaths from heart disease among persons 5 to 24 years of age. Since the majority of such deaths are due to rheumatic heart disease, these data may be interpreted to show a reduction in mortality from that cause.

DENTAL CARIES

In previous epidemiological studies, a marked difference has been found in the amount of dental caries in cities that seem comparable in all respects save for the mineral composition of the public water supplies. An identifiable factor responsible for the small amount of dental caries in some communities, as compared with a greater amount in others, appears to be the fluoride content of the domestic water. During the past year, this phenomenon was more thoroughly explored.

Some 6,500 school children, 12 to 14 years of age, were examined in 18 cities in 4 States. Monthly water samples from each of the cities were obtained and complete mineral analyses were made. The fluoride content of the waters ranged from 0 to 2.5 parts per million, the permanent hardness, from 20 to 350 parts per million. A close inverse correlation was found between the fluoride content of the water and the amount of dental decay in the children; no quantitative relation was found between the permanent hardness of the water and dental caries. Unusually low amounts of dental caries were found in communities where the fluoride content of the drinking water was 1.0 parts per million, an amount which has not been considered sufficient to produce a community mottled-enamel problem.

PARASITIC DISEASES

Continued progress was made on studies of the incidence of trichina infestation in various population groups. Additional random samplings emphasize previous findings that approximately one in every six urban residents examined is infested. On the other hand, surveys of rural groups indicate that the rate of infection is somewhat lower in the rural population. Experiments in Puerto Rico on individuals harboring helminth parasites other than trichinae demonstrated the specificity of the skin test for the diagnosis of trichinosis.

Evidence obtained during the year has shown that the hygienic measures commonly advocated for the control of oxyuriasis are without value. Commercial fumigants failed to have any lethal effect on pinworm ova, a result which further emphasizes the difficulty of controlling infection within the household.

PATHOLOGY

Studies in the pathology of experimental infections and of infectious diseases in man were continued. Significant contributions were made in experimental poliomyelitis and progress has been made in outlining the extent of the brain injury resulting from this disease in man.

A study on the pathology of Rocky Mountain spotted fever in man, which has been in progress for 10 years, was completed. For more than 15 years, the Division of Pathology has been engaged in a survey of specific histologic types of cancer among seamen and other beneficiaries of the Public Health Service. This investigation has also been completed, and reports on both this and the Rocky Mountain spotted fever study are being prepared.

The Public Health Service is now represented on the Commission on Standardization of Biological Stains, thus establishing liaison between the two research organizations. Special attention has been devoted to the testing of stains for malaria parasites, and a new stain composed entirely of American ingredients has been developed.

PUBLIC HEALTH METHODS

An important function of the Public Health Service is to study methods of bridging the gap between scientific knowledge and its practical application. Thus the work on public health methods embraces the statistical appraisal of public health problems and the development and evaluation of administrative, diagnostic, therapeutic, and engineering methods applicable to the solution of the health problems of groups of people.

The data on sickness, physical handicaps, and medical care accumulated by the Service are of particular value today in appraising health problems to be met in the coming months. For example, the high proportion of remediable physical defects found among youths and adult males in the National Health Survey indicates the need for a program of physical rehabilitation in connection with plans for the national defense.

The lack of hospitals and health centers in rural areas is a major need to be met in any national health program. A study of the minimal immediate need for general hospital facilities in rural areas showed a deficiency of at least 270 hospitals ranging in size from 30 to 100 beds and including a total of 15,500 beds.

The National Health Survey has shown a marked excess of sickness and of home accidents among persons living in crowded, low-rent houses. The definite relationship between adequate housing and good health should receive the serious attention of organized health agencies.

Studies of the educational attainment and experience of professional workers in health departments and detailed job analyses of the activities of public health nurses and sanitary inspectors have been made during the year.

Studies of diagnostic procedures and evaluation studies of respiratory disease therapy will provide valuable information to both clinicians and administrators of pneumonia control programs. Consultation services have been rendered to a number of State health departments. As a result of control programs in 32 States several thousand human lives have been saved and periods of disability due to pneumonia reduced by many thousands of days.

Studies of the tuberculin test indicate that, while the test is specific in low dosages, nearly all children will react if a sufficiently large dosage is given. Preliminary technical evaluation and clinical application of the 35-mm. microfilm X-ray indicates that this method may be applied in routine tuberculosis case-finding programs.

THE NATIONAL CANCER INSTITUTE

The National Advisory Cancer Council recommended to the Surgeon General 17 grants-in-aid for research projects totaling \$81,970. Thirteen grants-in-aid totaling \$61,380 were approved and allocated during the current fiscal year. In cooperation with private foundations interested in the cancer problem, the Council has also taken initial steps in the coordination of cancer research throughout the country.

Twenty-three research fellows were on duty, 15 at the National Cancer Institute and 8 in private institutions; and 31 physicians were in training for special work in the diagnosis and treatment of cancer. Loans of radium for use in the study and treatment of cancer were made to 47 hospitals in 24 States and in Hawaii. Approximately 925 patients had been treated with Government-owned radium by July 1, 1940.

The National Cancer Institute has provided consultation services on cancer control problems to various State health departments and State medical societies. During the year 7 States were added to the number having cancer control programs, bringing the total tax-supported State cancer control programs to 17. Seven States with previously inaugurated programs expanded activities during the year.

The National Cancer Institute Building was occupied in October 1939. It provides excellent facilities for a staff of some 38 scientists and their technical assistants. The staff, which includes representatives from the various sciences, makes possible for the first time in a

single institution a comprehensive and coordinated attack on the cancer problem.

Particular attention has been given to the study of cancer of the lung, skin, breast, and gastrointestinal tract. Intestinal cancer was produced in mice, thus permitting a thorough experimental study of this disease. Genetic studies have revealed a paternal influence in the production of breast cancer in mice, whereas heretofore only the maternal influence was presumed to be concerned in this type of malignancy. Progress has been made in the study of the influence of the mother's milk on the incidence of breast cancer among foster-nursed offspring. Leukemia was induced by painting the skin of certain inbred strains of mice with carcinogenic chemicals. There is no apparent parallelism with regard to the susceptibility of inbred animals to natural and chemical leukemia, such as is found in other types of malignancies.

New cancer-producing chemicals have been discovered, and progress is being made in the study of the carcinogenic properties of chemicals related to natural body constituents. Contributions have been made to fundamental knowledge of the mechanism of action of cancer-producing chemicals and gamma rays. Discovery of a riboflavin deficiency in liver tumor tissue contributes to the understanding of the defective oxidation of sugars by cancerous tissues.

Information concerning the health hazards to personnel exposed to high-energy radiation was obtained in a preliminary survey of radiologic clinics. The findings justify an extension of this investigation because many thousands of persons are employed in such clinics.

Field studies have brought out a strikingly higher incidence of skin cancer in the southern States as compared with the northern States. The incidence of cancer of certain other sites also appears to differ in geographic distribution.

MENTAL HYGIENE

For the tenth consecutive year, the Public Health Service furnished the medical, psychiatric, and other technical services in Federal penal and correctional institutions. These services were extended to include units at three additional institutions. Efforts were continued for developing the most efficient medical service for inmates that reasonably can be attained. Extensive alterations at many of the hospitals transformed archaic and inadequate physical plants into modern, efficient units. Emphasis at each institution was placed upon facilitating the contact of inmates with the medical staff. As a result, inmates readily availed themselves of the opportunity and freely sought medical advice.

The United States Public Health Service Hospital at Lexington, Ky., operated during the year with an average daily population of 1,014. Nine hundred and forty-eight patients were admitted and 1,122 were discharged during this period. Twenty-seven patients were discharged by parole and no parole violators were returned. During the preceding year, parole was granted to 10 patients and 2 were returned as violators. Of the 447 patients discharged on conditional release, 47 were returned for violating the conditions of their release. This compares favorably with the preceding year, during which 409 patients were discharged by conditional release and 87 were returned. Custody was made as unobtrusive as possible, and at the close of the

fiscal year 45 percent of the patients were under minimum custody (trusties).

The practice of granting leaves of absence to voluntary patients has been extended and has proved a useful procedure, as it allows these patients to make an attempt at readjustment in a less restricted environment than the institution affords. It also gives the patient's physician an opportunity to evaluate the results of treatment and, to some extent, to modify future treatment. The care of voluntary patients remains far from satisfactory, however, because so many leave before the treatment is completed. Only 15 percent of the voluntary patients discharged during the year had remained for the time considered proper by the hospital authorities. Follow-up studies of patients discharged since the opening of the institution revealed that 32.81 percent had not relapsed to the use of drugs.

The program of the United States Public Health Service Hospital, Fort Worth, Tex., has been very closely coordinated with that of the Lexington Hospital. The primary construction program was completed during the year to a point where the intended capacity of 1,000 beds was established. In the last few months of the current fiscal year, patients were admitted in increasing numbers, and the hospital was progressing rapidly toward capacity operation. The total number of patients admitted was 839, and 423 were discharged. The average daily population was 410. This institution was also operated with a minimum of emphasis on custodial features and about 80 percent of the patients were trusties. Follow-up studies of former patients 6 months after discharge indicate that about 40 percent are making a satisfactory social adjustment without drugs.

Studies of the nature and treatment of drug addiction were continued in cooperation with other agencies interested in the problem. Studies of the addiction characteristics of members of the morphine series, through their substitution for morphine in the treatment of addicts, have been continued and extended. A study of the effects of thiamin on the abstinence syndrome indicated that this vitamin does not significantly affect the withdrawal syndrome. Studies have been continued on the effects of small doses of morphine, codeine, heroin, and synthetic analgetics on abstinence syndromes of mild or moderate intensity. The results indicate measurable reductions in abstinence syndrome intensity by members of the morphine series, but show no significant deviation from expectancy by other preparations. Significant progress was made in the studies of the excretion of morphine in the urine of morphine addicts. Electroencephalographic studies were continued on patients during addiction and following withdrawal; the results suggest that the primary action of morphine is not upon the cerebral cortex.

Diagnostic psychiatric service to Federal courts was continued during the year by the units previously established in connection with 10 selected courts. Lack of funds prevented further expansion of this activity.

On July 1, 1939, a Section on Mental Health Methods was established to take over the study of mental hospitals which formerly had been conducted by the Mental Hospital Survey Committee. Surveys were made of 30 hospitals for the care of the mentally ill and 19 other institutions were visited to note changes and betterments in practice,

or to provide advisory services. Six of the institutions visited were general hospitals which maintain psychiatric wards.

Field studies in mental hygiene, carried on in Fayette County, Ky., were continued during the year. The original plan of investigation and demonstration based on clinical and statistical studies of a single community was replaced during the year by a plan which contemplated the establishment of a Bureau of Mental Health in the Kentucky State Department of Health and the development of an analytic study of the socio-economic relationships of mental disorder on a State-wide basis.

At the close of 1938, there were 513,858 patients in hospitals for mental disease, and an additional 119,787 in hospitals for mental defect and epilepsy. It is well known that these figures express only a fraction of the whole problem in the United States, and that thousands of sufferers from these conditions are treated outside of institutions, or remain undiscovered and untreated.

In the annual reports of the Public Health Service for 1938 and 1939, attention has been called to these conditions and to the paucity of research in these fields. It was recommended that an institute be established in the Public Health Service for the study of mental and nervous diseases and epilepsy. The plan has been strongly endorsed by the American Psychiatric Association, the American Neurological Association, the Section on Nervous and Mental Diseases of the American Medical Association, and by many individual psychiatrists and neurologists.

Previous recommendations included the provision of 350,000 cubic feet of laboratory space and 200 hospital beds for the necessary clinical research. At that time, it was proposed that the institute be attached to the Marine Hospital at New York, N. Y. With the transfer of St. Elizabeths Hospital, Washington, D. C., to the jurisdiction of the Public Health Service, consideration is now being given to the advisability of establishing the institute on the grounds of St. Elizabeths.

An institute for the study of this comparatively neglected group of diseases is greatly needed. Its establishment is strongly recommended. Already the Public Health Service is considering the appointment of an advisory council to explore possible methods of research and to plan for meeting existing needs adequately, with a minimum expenditure of funds commensurate with the accomplishment of desired results.

MARINE HOSPITALS AND RELIEF STATIONS

Demands for out-patient and hospital care of American merchant seamen and other beneficiaries of the Public Health Service have increased throughout the year. More than 2,000,000 hospital-days of care were furnished to some 70,000 patients, while 353,724 patients received nearly a million and a half office treatments. Thus, approximately 424,000 patients received treatment in the 26 marine hospitals and 126 other relief stations of the Public Health Service. A total of 213,778 physical examinations was performed. Although merchant seamen continued to compose the largest single group of patients, definite increases were noted in the number of patients from other classes of beneficiaries.

In order to meet adequately the increased demand for medical and surgical relief, it has been necessary to provide additional personnel

and facilities. Two new hospitals, at the port of Boston and at Kirkwood, Mo., have been completed and occupied during the current year. Funds have already been appropriated for further improvements at other hospitals, all of which are urgently required. Adequate facilities for the prompt admission and proper care of women beneficiaries seeking treatment in the marine hospitals are still lacking.

In addition to the services furnished at the various relief stations throughout the country, emergency medical relief is provided for employees of the Federal Government in Washington, D. C. Seventeen first-aid units are located in various Government buildings and are conducted by Public Health Service personnel.

The organization of the Tumor Clinic at the Baltimore Marine Hospital has been practically completed. Patients have been received and treated in the clinic since November 1, 1939, during which time 183 persons have been hospitalized and 43 have been treated as outpatients; 146 other patients have been seen or examined in consultation.

The 44-hour work week was established in all marine hospitals, as the result of the provision of funds for additional ward service and kitchen personnel.

Included in the most recent recommendations made by the Public Health Service for new construction are the following marine hospital projects:

1. Stapleton, N. Y., marine hospital (completion)-----	\$4,200,000
2. Fort Stanton, N. Mex., marine hospital (replacement)-----	2,260,000
3. Galveston, Tex., marine hospital (extension and remodeling)----	470,000
4. Carville, La., marine hospital (replacements)-----	900,000
5. Seattle, Wash., marine hospital (additional facilities)-----	250,000
6. Norfolk, Va., marine hospital (additional land and facilities)----	175,000
7. Savannah, Ga., marine hospital (additional land and facilities)--	480,000
8. New Orleans, La., marine hospital (additional facilities)-----	180,000
9. New York, N. Y., 67 Hudson St., marine hospital (repairs, etc.)--	70,000
10. Pittsburgh, Pa., marine hospital (remodeling and facilities)----	70,000
11. Mobile, Ala., marine hospital (extension and remodeling)-----	250,000
12. Philadelphia, Pa., relief station (remodeling)-----	57,000

All of the above projects are included in House Document No. 177, Seventy-sixth Congress, first session.

With reference to the requirements at Fort Stanton (item 2 above), it seems desirable to admit to this hospital tuberculous patients who are in the moderately advanced stage of the disease. If this is to be done, hospitalization facilities at Fort Stanton must be increased.

Two tuberculosis hospitals are needed; one near the east coast and one in southern California. The latter desirably should be combined with a general marine hospital which is needed in that area.

New marine hospital facilities for general medical and surgical cases are much needed on the mainland of Florida.

QUARANTINE AND IMMIGRATION ACTIVITIES

Although quarantinable diseases were prevalent in many parts of the world during the year, the only cases to reach United States territory were two cases of smallpox, one of which arrived at Honolulu and the other at New Orleans.

Successful measures were taken during the year to prevent the introduction by aircraft of yellow fever from South America, where it is

present in practically the entire continent north of 30° south latitude. In addition to the quarantine procedures described in previous annual reports, the measures included the disinsectization of aircraft from the east coast of South America on the water at Port-of-Spain, Trinidad; the conduct of surveys and demonstrations in connection with the control of *Aedes aegypti* mosquitoes at Charleston, S. C., and Brownsville, Tex.; and the immunization against yellow fever of operating personnel of the airlines.

With a view to preventing the spread, through interstate traffic, of endemic typhus fever, which has been increasing in recent years in the southern States, steps were instituted during the year for the control of rat infestation on coastwise and intercoastal vessels. This campaign has met with the full cooperation of the shipping interests.

A new quarantine station is to be constructed in the near future at Galveston, Tex. Funds have also been allocated for the erection of a quarantine station for Philadelphia, Pa., but a suitable site has not yet been procured.

During the year quarantine officers of the Public Health Service inspected 15,607 vessels, carrying 489,157 passengers and 933,360 seamen, and fumigated 900 vessels. Examinations of the rats recovered following fumigation showed none of them to be plague infected. Inspections were made at United States airports of entry of 2,184 airplanes, carrying 35,667 passengers, of whom 11,171 were aliens.

Medical officers at the various United States ports of entry examined 637,398 alien passengers and 551,489 alien seamen. Eighteen thousand seven hundred ninety-three passengers and 1,271 seamen were certified to immigration officials as having mental or physical defects or diseases.

A total of 64,442 applicants for immigration visas was examined by medical officers of the Public Health Service stationed at American consulates in foreign countries; of these, 576 were reported by medical officers to the American consuls as being afflicted with defects or diseases which rendered their exclusion mandatory, and 15,046 were certified as suffering from diseases or conditions likely to affect their ability to earn a living. Only 6 of the aliens to whom visas had been issued following preliminary medical examinations in foreign countries were certified upon arrival in United States territory as having a condition requiring deportation.

Owing to the war, the danger of the spread of quarantinable diseases to the United States and its possessions from infected areas abroad is steadily increasing. In view of this condition, the intensive efforts now being put forth to prevent such a contingency will not only be continued but will be augmented from time to time should future developments warrant. Certainly there should be no further curtailment of quarantine facilities in the United States, in view of world conditions.

PREVALENCE OF DISEASE

WORLD PREVALENCE

World conditions were not conducive to good reporting of quarantinable diseases during the calendar year 1939. The Public Health Service continued to receive reports from officers of the Service,

American consulates, and international health organizations. Incidence of disease here recorded can do no more than indicate the trends; actual numbers would no doubt exceed those reported. Owing to present war conditions, no accurate information can be obtained for large areas of the world.

The reported world prevalence and mortality of smallpox in 1939 was 164,771 cases and 33,026 deaths as compared to 124,269 cases and 26,148 deaths in 1938. The 129,615 cases and 30,134 deaths in India alone exceeded world totals for 1938. A decline was registered in the United States, with 9,877 cases of smallpox in 1939, as compared to 14,939 in 1938; Belgian Congo reported 6,731 cases in 1939.

Cholera was confined principally to India, China, Iran, and Afghanistan. India reported 139,293 cases and 70,109 deaths, as compared to 356,373 cases and 174,213 deaths for 1938.

A total of 38,700 cases of plague was reported with more than 22,000 deaths in 1939. India alone reported 38,078 cases and 20,718 deaths. Plague was prevalent also in Uganda, Ecuador, Thailand, Brazil, Belgian Congo, Java, and Madura which reported 1,543 deaths.

The usual widespread prevalence of typhus fever was in evidence. Available information shows a total of 27,772 cases as compared to 27,326 in 1938. The countries reporting the greatest number of cases were, in the order named, Tunisia, Egypt, Poland, the United States, and Algeria.

Reported yellow fever incidence was confined to Brazil, Ivory Coast, Senegal, Nigeria, Niger Territory, French Equatorial Africa, Colombia, French Cameroons, Gold Coast, and Togo. Of the 159 deaths reported in 1939, Brazil reported 128.

MORBIDITY AND MORTALITY IN THE UNITED STATES

Morbidity.—Health conditions remained generally favorable throughout the Nation during the calendar year 1939. No case of cholera has originated in the United States since 1911, and the last case of yellow fever occurred in 1924. One case of human plague occurred in Utah in December 1939.

The appreciable decline in smallpox morbidity in the United States continued through the first 8 months of 1940. During that period 2,144 cases were reported, as compared to 3,823 cases for the comparable period in 1934 when fewer smallpox cases were reported than in any year since records have been available. This trend gives encouragement that the United States may lose her unenviable position of second place in the number of cases of smallpox reported annually by civilized nations.

Diphtheria, measles, meningococcus meningitis, poliomyelitis, scarlet fever, and typhoid and paratyphoid fever were well below the median prevalence for the 5-year period 1934-38; and, with the exception of poliomyelitis, fewer cases of each of these diseases were reported in 1939 than in 1938. An outbreak of poliomyelitis occurred early in the summer of 1939 in the South Atlantic States and later spread to all sections of the country. Thus, although the prevalence of poliomyelitis was below the median for 1934-38, it was four times greater in 1939 than in 1938.

The prevalence of influenza showed a marked increase in 1939. An outbreak started in February and subsided about the middle of May. In October, another outbreak occurred and influenza prevailed well above normal expectancy until the close of the fiscal year, June 30, 1940. A total of 275,503 cases of influenza was reported in 1939, more than twice the number in 1938, and 40 percent above the median for the 1934-38 period.

Human cases of rabies decreased from 71 in 1938 to 44 in 1939. An appreciable decrease was noted in the incidence of undulant fever.

Mortality.—The information here presented on mortality rates by cause of death is based upon preliminary data for 1939 collected by the Public Health Service from 45 States, the District of Columbia, Hawaii, and Alaska. These data for a number of years have provided, and continue to provide, the earliest available comparative material on mortality in the United States. Data from these sources indicate that the general death rate for 1939 will differ only slightly from that of 1938, if at all. With an increasing average age of the population the present low general death rate will increase progressively in future years. Thus, it is encouraging to note that the provisional crude death rate of 10.7 for 1939 is only slightly higher than the lowest recorded rate of 10.6 per 100,000 population in 1938. The provisional reports of the Bureau of the Census show a total of 1,387,797 deaths in 1939 as compared to 1,381,391 in 1938.

The mortality rates from the following diseases were the lowest reported during the past 5 years: Typhoid and paratyphoid fever, measles, scarlet fever, diphtheria, encephalitis, meningitis, tuberculosis, malaria, pellagra, pneumonia, digestive diseases, diarrhea and enteritis (under 2 years), nephritis, and accidents, including automobile accidents.

The maternal mortality rate declined for the tenth consecutive year. The provisional rate was 10 percent less than that of 1938, and more than 40 percent less than in 1930. For the first time since such data have been available, the maternal mortality rate was less than 4 per 1,000 live births.

The death rate from pneumonia was unusually low in 1939, and represents a decline of more than one-third from that of 1936. Only 2 States reported higher pneumonia rates than in 1938. This is especially significant in view of the fact that a sharp increase in the prevalence of influenza, such as that experienced in 1939, is usually accompanied by an increase in pneumonia mortality. The marked decrease in pneumonia deaths during the past 2 years reflects the more extensive use of improved diagnostic techniques and of new methods of treatment.

The widespread safety campaign against automobile accidents has contributed to a decreased death rate from this cause for the second consecutive year. The provisional rate for fatal automobile accidents was 23.7 per 100,000 population for 1939, 20 percent less than the corresponding rate of 1937, in which year the highest death rate from this cause was reported.

Mortality from each of the four principal communicable diseases of childhood, measles, whooping cough, scarlet fever, and diphtheria,

decreased appreciably for 1939; indeed, the death rate from diphtheria has declined nearly 50 percent during the past 5 years.

The principal diseases for which higher mortality rates were reported in 1939 than in 1938 are: Influenza, cancer, diabetes, cerebral hemorrhage, and heart disease. In addition, the minor epidemic of poliomyelitis increased the death rate from that disease slightly over that of 1938. The increase of influenza mortality, resulting from the epidemic of 1939, occurred in all parts of the country, 42 of the 46 States reporting higher rates than in 1938.

The remaining diseases for which higher death rates were reported, namely, cancer, diabetes, cerebral hemorrhage, and heart disease, are primarily disorders of middle adult life and old age and the increase in deaths from these causes is largely due to the ageing of the population. It is encouraging to note, however, that the rise in each instance, except in diabetes, was less than 4 percent over the rate for 1938.

The provisional infant mortality rate of 47 per 1,000 live births was the lowest on record and represents a decline of 15 percent during the past 5 years. Only 5 States reported higher rates in 1939 than in 1938.

Birth rate.—After a temporary increase in 1937 and 1938, the birth rate declined about 2 percent during 1939. Twenty-eight of the 46 States reported decreases. The crude rate of natural increase of 6.6 per 1,000 population in 1939 was slightly less than that recorded in 1938, namely, 7.0 per 1,000.

THOMAS PARRAN,
Surgeon General.

Hon. PAUL V. McNUTT,
Federal Security Administrator.

DIVISION OF DOMESTIC QUARANTINE (STATES RELATIONS)

Assistant Surgeon General JOSEPH W. MOUNTIN in charge

THE COOPERATIVE PUBLIC HEALTH PROGRAM

The Public Health Service has been actively collaborating with States in the organization and maintenance of State and local health services since 1917 when the first appropriation, \$25,000 in amount, was provided for cooperative studies and demonstrations in rural health work. With the passage of the Social Security Act in 1935, authorizing an annual appropriation of \$8,000,000 to be used as grants-in-aid to States in the establishment and maintenance of State and local health services, activities in cooperative public health programs expanded in proportion.

The Social Security Act amendments of 1939 increased the amount authorized for grants-in-aid to the States under title VI to \$11,000,000 annually. Under this authorization an additional \$1,500,000 became available to the States on October 1, 1939, increasing the total appropriation for the fiscal year ending June 30, 1940, to \$9,500,000.

During the fiscal year 1940, the amount of title VI funds paid to the States was \$9,500,706.43. The distribution of this amount among the States is given in table 1.

TABLE 1.—*Payments to States under sec. 601 of the Social Security Act for the fiscal year ending June 30, 1940*

State	Total payment	State	Total payment
Alabama.....	\$303,323.00	Nebraska.....	\$51,411.00
Alaska.....	38,050.00	Nevada.....	27,809.93
Arizona.....	64,627.00	New Hampshire.....	54,762.00
Arkansas.....	224,982.00	New Jersey.....	222,818.00
California.....	333,781.86	New Mexico.....	81,757.00
Colorado.....	95,879.95	New York.....	586,862.00
Connecticut.....	108,343.00	North Carolina.....	347,665.00
Delaware.....	32,643.00	North Dakota.....	75,416.68
District of Columbia.....	69,379.02	Ohio.....	396,336.00
Florida.....	155,297.00	Oklahoma.....	206,617.28
Georgia.....	286,481.00	Oregon.....	82,601.08
Hawaii.....	63,751.00	Pennsylvania.....	552,117.30
Idaho.....	78,649.94	Rhode Island.....	64,156.00
Illinois.....	413,438.09	South Carolina.....	224,048.00
Indiana.....	225,088.53	South Dakota.....	76,407.00
Iowa.....	193,577.00	Tennessee.....	256,568.12
Kansas.....	139,202.00	Texas.....	445,969.00
Kentucky.....	275,704.00	Utah.....	66,987.00
Louisiana.....	180,803.00	Vermont.....	51,328.00
Maine.....	50,359.07	Virginia.....	234,251.00
Maryland.....	133,534.00	Washington.....	125,845.00
Massachusetts.....	250,620.00	West Virginia.....	161,256.78
Michigan.....	288,985.00	Wisconsin.....	177,662.00
Minnesota.....	190,747.88	Wyoming.....	20,223.62
Mississippi.....	248,362.00	Puerto Rico.....	128,815.00
Missouri.....	267,485.00		
Montana.....	67,923.30	Total.....	9,500,706.43

The total amount of funds budgeted from all sources in cooperative health programs in the 48 States, District of Columbia, 2 Territories, and Puerto Rico during 1940 was \$83,790,782.70, whereas in 1939 the amount was \$51,076,361.07, an increase of \$32,714,421.63. Over \$25,000,000 of this increase was reported under cooperative local health programs; the greatest proportion of the increase is due to the fact that certain large cities now participating in cooperative health programs are submitting their budgets to the Public Health Service. Some of the increase is caused by changes in budgetary practices in the States, including more complete reporting; and new funds account for a part of the increase. Although \$1,500,000 of new funds became available under title VI, the proportion that title VI funds bear to the total budgeted from all sources dropped from 16 percent in 1939 to 12.9 percent in 1940. This again reflects the increase in the total amount budgeted from all sources.

The additional \$1,500,000 that became available to the States on October 1, 1939, was utilized in large proportion to strengthen or establish special programs in pneumonia, tuberculosis, cancer, malaria, dental hygiene, and industrial hygiene. A comparison of the budgets for the above six activities in September 1939 with those in June 1940 shows an increase of 62 percent.

The distribution of funds budgeted from all sources and from title VI alone according to the purposes for which the funds were budgeted by the States and Territories during the past fiscal year is shown in table 2. Column 3 of table 2 gives a statistical summary of the distribution of funds budgeted from title VI according to the type of service. It is noted that a little over 41 percent of the funds are budgeted for local health services. Such services are a most important phase of public health. Title VI funds under this item assist in the maintenance of county, district, and other types of health service, including a few cities and some health service in unorganized areas. Salaries and travel of health officers, nurses, sanitarians, salaries of other personnel, purchase of drugs and diagnostic equipment are subsidized in part from title VI funds.

TABLE 2.—*Funds budgeted from all sources for cooperative health work, by purpose, and proportion of contribution from title VI funds for the fiscal year ended June 30, 1940*

Purpose	Amount budgeted from all sources	Percent of funds budgeted for each purpose		Ratio of title VI funds to amount budgeted from all sources
		All sources	Title VI	
Training.....	\$1,632,161.56	1.95	10.10	67.17
General administration.....	2,507,867.54	2.99	4.60	19.90
Capital investment.....	333,800.00	.40		
State-wide health services:				
Preventable disease control:				
General.....	1,072,766.46	1.28	2.24	22.64
Tuberculosis.....	1,007,909.35	1.20	3.26	35.08
Venereal diseases.....	1,007,268.39	1.20	.14	1.63
Pneumonia.....	659,057.36	.79	3.85	63.43
Cancer.....	354,990.65	.42	1.49	45.62
Malaria.....	285,721.87	.34	1.17	44.30
Rodent plague.....	156,328.44	.19	.43	29.60
Trachoma.....	62,577.50	.07	.16	28.22
Laboratory.....	4,507,363.70	5.38	4.95	11.92

TABLE 2.—*Funds budgeted from all sources for cooperative health work, by purpose, and proportion of contribution from title VI funds for the fiscal year ended June 30, 1940—Continued*

Purpose	Amount budgeted from all sources	Percent of funds budgeted for each purpose		Ratio of title VI funds to amount budgeted from all sources
		All sources	Title VI	
State-wide health services—Continued				
Sanitary engineering.....	\$3, 163, 954. 81	3. 78	7. 62	26. 16
Maternal and child health.....	2, 966, 474. 13	3. 54	. 19	. 70
Vital statistics.....	1, 615, 748. 93	1. 93	2. 69	18. 09
Aid to crippled children.....	1, 390, 965. 06	1. 66	-----	-----
Supervision of local health services.....	1, 136, 922. 95	1. 36	5. 08	48. 61
Public health nursing.....	1, 099, 644. 63	1. 31	1. 67	16. 48
Food and drugs, including narcotics.....	661, 842. 03	. 79	. 96	15. 82
Public health education.....	572, 784. 27	. 68	1. 70	32. 18
Industrial hygiene.....	518, 956. 18	. 62	3. 73	78. 12
Dental hygiene.....	474, 559. 65	. 57	. 75	17. 26
Medical care.....	162, 497. 50	. 19	. 74	49. 42
School medical inspection.....	158, 506. 00	. 19	. 23	15. 43
Mental hygiene.....	116, 757. 00	. 14	. 30	28. 10
Surveys and studies.....	93, 500. 76	. 11	. 37	42. 93
Board of examiners and registration.....	44, 300. 00	. 05	-----	-----
Embalming and undertaking.....	39, 680. 00	. 05	-----	-----
Institutional care.....	2, 035, 333. 24	2. 43	-----	-----
Tuberculosis sanatoria.....	5, 127, 473. 00	6. 12	-----	-----
Local health services.....	48, 823, 069. 74	58. 27	41. 58	9. 25
Total.....	\$3, 790, 782. 70	100. 00	100. 00	12. 96

It has been demonstrated that certain health services are best operated on a State-wide basis. Although these services are administered at the State level, they supplement or substitute for local health service. Sanitary engineering personnel are engaged in the supervision of water supplies, milk supplies, shellfish sanitation, and general environmental sanitation in the States. Reference to column 3 of table 2 shows that 7.6 percent of all title VI funds are budgeted for sanitary engineering. Again, almost 5 percent of the funds are used to assist in the maintenance of State-wide laboratory service, which is a vital part of a good public health program. In many States the tuberculosis control program operates on a distinctly local basis. Special tuberculosis diagnostic clinics, to which patients are referred for examination and X-ray of the chest, may be held at a scheduled time. Tuberculosis control accounts for 3.3 percent of the funds budgeted under title VI.

Although table 2 divides health service into State-wide and local, it may be inferred from the above discussion that much of the State-wide type of health service has a local application. Funds budgeted for such services do not represent the cost of general administration of health departments in the States. General administration accounts for only 4.6 percent of title VI funds, and about 3 percent of funds budgeted from all sources.

In general, title VI funds constitute a generous proportion of the total amounts budgeted for special activities that have developed in recent years. This is shown in column 4 of table 2. Thus under industrial hygiene, a health activity of increasing importance, 78 percent of the total budget for this activity is derived from title VI. Title VI funds constitute 67 percent of the total amount budgeted for training. Pneumonia control is a recent addition to the activities of a health department; in this instance over 63 percent of the total funds budgeted are from title VI. Such figures show quite clearly that these grant-in-

aid funds are used more particularly for the development of new services rather than for the support of the administrative structure and established routines.

PUBLIC HEALTH IN THE STATES

In the preceding section a general discussion of health service under title VI in cooperative public health programs with the States has been presented. Certain factors affecting public health programs in the States should be noted. These factors, together with brief progress reports of several health activities, will be given in the following paragraphs.

Merit system of personnel administration.—The desirability of qualified personnel, tenure of office, and other advantages of a well-regulated system of personnel administration for the employees of State and local health departments has been commented on in previous reports. Under the amended regulations covering the allotment and payment to States of title VI funds, dated December 29, 1939, the States are now required to submit, as a part of the State plan, a "plan for a merit system of personnel administration as is now in effect or may hereafter be adopted applicable to any State or local health personnel." If, after review by the Public Health Service, the plan is found to be acceptable, it shall apply to State and local personnel rendering service in accordance with cooperative budgets submitted by the State. At the time this regulation was adopted, either the health department was operating under State civil service or there was enabling legislation for such a system in 20 States. In the remaining States, the health departments have been engaged in developing a merit system for their personnel. During the period of development of the merit system in the States, the Public Health Service is working closely with the Children's Bureau of the Department of Labor to the end that a common agreement may be reached on Federal policy. In those instances where the State health department has elected to enter a joint merit system with the State agencies administering Social Security grants, the Public Health Service collaborates with the Social Security Board as well.

Personnel training.—The program for the technical training of health department personnel, which began early in 1936, has continued during the fiscal year. The number of persons who began an organized period of training in public health by type of trainee under Federal auspices during the fiscal year 1940 is shown in table 3. Of the total of 1,094 trainees, 737 were financed in full or in part by funds made available by the Public Health Service. A comparison of the number of persons trained during the fiscal year 1940 with the number who received organized training in the preceding year shows a slight increase. The training program was instituted to help meet the immediate demand for trained workers brought about by an expanding health program; and as the supply of trained personnel and the demand therefor are brought more nearly into equilibrium, it is expected that the training program will sponsor fewer trainees.

TABLE 3.—*Number of trainees reported by type and source of training funds, 1940*

Source of training funds	Total	Type of trainee			
		Physicians	Nurses	Sanitarians	Other
All sources.....	1, 094	285	626	107	76
Public Health Service.....	712	242	329	89	52
Children's Bureau.....	217	9	202	0	6
Other.....	30	13	13	2	2
Public Health Service and Children's Bureau.....	12	1	10	0	1
Public Health Service and other.....	12	0	12	0	0
Children's Bureau and other.....	6	0	6	0	0
Public Health Service, Children's Bureau, and other.....	1	1	0	0	0
Unknown.....	104	19	54	16	15

Although the number of trainees appears to be fairly constant, their qualifications are improving. Provisional figures from a preliminary study of trainees show that among a selected sample of physicians who received public health training in 1937, only one had previously graduated from a school of public health and only 2 percent had had any formal training in public health work, whereas in 1940, 7 percent had graduated in public health and 22 percent had attended formal courses of instruction in schools of public health. Among nurses, the comparable percentages for 1937 were 0.2 and 6.5; for 1940, they were 9.1 and 37.0. Sanitarians and other personnel in public health work showed similar improvement in qualifications.

Public health nursing.—The annual census of public health nursing revealed very few increases in the number of nurses employed on January 1, 1940, as compared with the number who were employed a year ago. There was considerable increase in the number of industrial nurses reported. This may not indicate an actual increase in the number of industrial nurses employed but a better reporting of this type of worker to the several State health departments. Excluding the industrial nurses, the increase this year is only slightly over 1 percent, while the increase in 1939 was approximately 4 percent, and in 1938 about 9 percent.

Of the total of 23,705 public health nurses who were employed on January 1, 1940, about 44 percent were employed by official health agencies, approximately 17 percent by boards of education, about 25 percent by nonofficial health agencies, and a little less than 14 percent by industrial companies. Less than 1 percent were employed by national agencies.

TABLE 4.—*Number of public health nurses employed in the United States and Territories of Alaska and Hawaii by type of employing agency, 1937 to 1940, inclusive*

Employing agency	Number of nurses employed in—			
	1937	1938	1939	1940
All agencies.....	19, 939	21, 886	23, 029	23, 705
State agencies.....	791	827	814	840
Local health departments ¹	7, 572	8, 702	9, 180	9, 700
Local boards of education.....	3, 477	3, 887	4, 120	3, 952
Local nonofficial agencies.....	5, 791	5, 963	5, 947	5, 820
Industrial companies.....	2, 203	2, 384	2, 841	3, 271
National agencies and universities.....	105	123	127	122

¹ Includes local Indian services.

Considerable progress has been made in improving the qualifications of public health nurses during the past 6 years. In 1934, when the National Organization for Public Health Nursing published the Survey of Public Health Nursing, it was found that only about 7 percent of the public health nurses employed at that time had completed an academic year of training in an approved public health nursing course of study. This year, through the cooperation of the State health departments, the Public Health Service obtained information on the qualifications of 17,471 of the 19,117 nurses employed in State and local health services in 47 States, the District of Columbia, Hawaii, and Alaska. California did not participate in the study and the returns from the industrial companies were so incomplete that they were not included in the tabulations. From table 5 it will be seen that slightly more than 22 percent of the nurses have completed one full academic year of training, and an additional 38 percent have had some university work in public health nursing.

TABLE 5.—*Public health preparation of State and local public health nurses by districts*¹

District	Number of public health nurses—		Number and percentage of nurses who—					
	On duty Jan. 1, 1940	For whom qualifications information was obtained	Had completed 1 or more years of university public health nursing work		Had some university public health nursing work but less than 1 year		Had no university public health nursing work	
Total, all States-----	2 19, 117	17, 471	Number 3, 907	Percent 22. 4	Number 6, 628	Percent 37. 9	Number 6, 936	Percent 39. 7
Northeastern-----	8, 432	7, 719	1, 437	18. 7	2, 904	37. 6	3, 378	43. 7
South Atlantic-----	1, 980	1, 873	294	15. 7	841	44. 9	738	39. 4
North Central-----	5, 073	4, 606	1, 208	26. 2	1, 838	39. 9	1, 560	33. 9
South Central-----	2, 497	2, 205	361	16. 4	821	37. 2	1, 023	46. 4
Western ² -----	1, 135	1, 068	607	56. 8	224	21. 0	237	22. 2

¹ Industrial nurses omitted.

² Exclusive of California, but inclusive of the Territories of Alaska and Hawaii.

Part of this improvement is no doubt due to the funds for training public health personnel which were made available as a result of the Social Security Act. During the past 5 years over 4,000 nurses have been granted stipends for further training in public health.

The amount of preparation possessed by public health nurses appears to vary according to the section of the country in which they are employed. The nurses employed in the States of the western district have had considerable more public health training than those in any of the other districts. About 57 percent of the nurses in this district have completed one or more years of public health training in an approved course of study.

In analyzing the qualifications of the nurses according to type of employment agency, it was interesting to note that the type of agency appeared to have less effect on the qualifications of the nurses who were employed than did the geographic region in which they were employed. Twenty-three percent of the nurses employed by health departments and other official health agencies had completed a year or more of public health study. The percentage of those nurses who were employed by nonofficial agencies was practically the same in

that it was 22.8. About 20 percent of the nurses employed by boards of education had completed a full year of training in an approved university course of study. However, about 40 percent of all the public health nurses who were employed on January 1, 1940, had not had any university training in public health.

An important factor in the qualification of nurses is the curriculum under which they are educated. At the request of the National Organization for Public Health Nursing, one of the public health nursing consultants of the Service has been assigned to a study of public health nursing curricula. This study will be made under the direction of a committee made up of representatives of the National Organization for Public Health Nursing, the Collegiate Council on Public Health Nursing Education, the American Public Health Association, and the Public Health Service. The purpose of this study is to reevaluate the objectives of the whole public health program, to define clearly the functions of the nurse in helping to attain those objectives, and then to prepare a curriculum guide which will outline what a nurse must know and what skills she must possess in order to perform those functions. The study will continue throughout the coming fiscal year.

Local health service.—It is recognized that the success of public health rests largely with the full-time local health unit. During the past year 1,577 counties were covered by some form of health service, either single county unit, district unit, or State supervisory district. In tracing the progress of the local health service, the number of counties served by a single county unit is more significant than the total number of counties covered by all forms of health service. On December 31, 1935, according to the latest revised count, there were 486 single county health units while on June 30, 1940, there were 655 such units, an increase of 169 units or 34.8 percent. During the fiscal year 1940 there were 18 new single county health units established, a 2.8 percent increase over 1939. The increase in the number of single county units has been perceptibly less in the last few years. The trend has been toward combining the resources of 2 or more counties in a district health organization. At the close of the fiscal year 1940, 356 counties were served by 122 local district health units, whereas on December 31, 1935, 124 counties were rendered health service by 41 district health units; this represents an increase during the 4½-year period of 187.1 percent in the number of counties under this type of health supervision and an increase of 197.6 percent in the number of district units. In addition to those counties under the above two types of health supervision, 566 counties were covered by 106 State supervisory units.

Industrial hygiene.—At the end of the fiscal year 1940, there were 40 industrial hygiene units in State and local health departments, distributed among 29 States, 2 Territories, and 9 cities. With the exception of the few States launching industrial hygiene services during the past year, all of the States have been actively engaged in the practical application of measures designed for the control of industrial health hazards. The majority of the industrial hygiene programs have been developed with the aid of funds received under title VI of the Social Security Act.

It should be recorded that the States of Connecticut, Idaho, Maryland, Minnesota, Mississippi, Montana, Rhode Island, and Utah have

enacted special legislation now in force, which places all industrial hygiene activities directly in the health departments of these States. In several of these States the laws specifically recommend cooperation with other State agencies—such as labor departments and industrial commissions—in the preparation of rules and regulations for the control of health hazards in industry, in the enforcement of such rules and regulations, and in the adjudication of compensation claims.

Marked advances may be recorded this year among the States in the control of many health hazards among workers and in bringing additional public health services to the working population by integrating the industrial hygiene program with other basic adult health services. The outstanding needs in industrial hygiene still consist of more adequate funds and trained personnel. This is especially true at this time, in view of the additional work which will be placed on industrial hygiene units throughout the country in connection with the national defense program.

Pneumonia control.—All of the 19 States and 1 Territory which had pneumonia control programs last year have retained them, and several of them have expanded the activity to give greater geographic coverage within their jurisdiction. During the year 14 additional States and 1 Territory made budgetary provisions for pneumonia control programs. In 11 of these States, the programs were in operation at the end of the fiscal year; in the remaining 3, preparations had not been completed. Thus there are 32 active and 3 inactive pneumonia control programs in State and Territorial health departments. Three States are engaged in the manufacture of anti-pneumococcic typing and therapeutic serums. The number of patients reached by the facilities provided under these programs was much greater than in any previous year, and the measures employed were at the same time much more effective. As a result, these programs have aided in the saving of several thousand human lives and in the total shortening of the period of disability by many thousands of days.

Malaria control.—Efforts are being made by the States in malarious areas to build up efficient State laboratory organizations for making blood examinations. The Public Health Service has cooperated with these States in this objective and has checked 7 laboratories for accuracy; classes for instruction in the thick film method of diagnosis have been held in 4 of the States. These classes were attended by 100 technicians from the State laboratories.

The malarious States are engaged in drainage of mosquito breeding bodies of water, the installation of permanently lined ditches, and other malaria control activities. The organization of the malaria control program at the Santee-Cooper project in South Carolina was completed during the year. During the fiscal year a cooperative study was commenced by the Tennessee Valley Authority, the Bureau of Biological Survey, the Bureau of Fisheries, the Bureau of Entomology and Plant Quarantine, the State health departments and conservation commissions of Tennessee, Alabama, and Mississippi, and the Public Health Service. The purpose of the study is to investigate the relationship of malaria control methods as practiced by the Tennessee Valley Authority to wildlife interests.

Dental hygiene.—On June 30, 1940, 38 States were operating dental hygiene programs in the State health department; in 3 additional States plans have been made to initiate such programs in the near future. The 38 States budgeted for dental hygiene about 0.9 percent of the total title VI funds available in these States. In most instances the program at the State level is largely educational and promotional in character. However, in several States the division of dental hygiene in the State health department provides a State-wide dental program which renders local dental service to certain classes of individuals.

Since it is felt that the most effective work in dental hygiene is to be done among children, the Public Health Service has been urging graduate courses in children's dentistry for practicing dentists. The services of a dental officer to conduct such courses have been offered to the States. Three States availed themselves of this service, and successful short courses have been given at selected points in the respective States. In addition, 10 other State health departments conducted graduate courses using their own dental personnel or employing specialists in the field of children's dentistry.

During the past fiscal year, 21 dentists employed by State and local health departments received graduate training in public health; 15 of these took 1 full academic year of training and received the degree of Master of Public Health. This number exceeds the combined total of those who have received training during the previous years of the training program.

CONSULTATION SERVICE TO THE STATES

Shortly after title VI of the Social Security Act became effective, 5 district offices were established in New York City, Washington, D. C., Chicago, Ill., New Orleans, La., and San Francisco, Calif. The district office, on the request of the State, furnishes a consultation service on problems pertaining to public health and on matters arising in the administration of title VI and the venereal disease act. These offices have effected a closer and more personal contact between the Public Health Service and the States than could be possible without this system. During the fiscal year 1940, the personnel of these district offices was augmented, and a sixth district office was established at San Juan, to coordinate public health work in Puerto Rico and the Virgin Islands.

Each district office is under the direction of a medical officer, assisted by a staff consisting of junior medical officers, sanitary engineers, a public health nurse, a field auditor, and the necessary clerical personnel. In addition to consultation on general administrative problems in public health, the district office offers consultation service in venereal disease control, public health nursing, and the several aspects of sanitary engineering. The field auditor, in addition to checking the accounts of the several States, serves as a consultant in fiscal and accounting practice. The services of the district offices have been in such demand that expansion appears necessary so that the numerous requests for consultation may be met.

Advisory and consultation services to the States in more specialized fields of public health were furnished by the central office upon re-

quest from the State. These specialized services include consultation in: (1) Industrial hygiene, (2) dental hygiene, (3) nutrition, (4) malaria control, (5) pneumonia control, (6) cancer control, (7) tuberculosis control, (8) public health education, (9) evaluation of health facilities, (10) recording of health work, (11) shellfish sanitation, (12) milk sanitation, (13) laboratory methods. Consultation in these specialized services is provided by commissioned officers and other personnel expert in the several fields, some of whom are attached to other Divisions, especially the Division of Scientific Research. Consultation has been in especial demand in some of the fields, particularly industrial hygiene, cancer control, and pneumonia control.

At the request of the appropriate health authorities, comprehensive health surveys were made of the city of Los Angeles, Calif., San Mateo County, Calif., Richmond, Va., Peoria, Ill., and Loudoun County, Va. A survey of the tuberculosis and venereal disease problems in San Antonio, Tex., was also undertaken. Surveys of local public health nursing services were made in Delaware County, Pa., Flint, Mich., and Larimer County, Colo. The purpose of these surveys is to define the extent and character of the health problems, including the existing health facilities, and on the basis of the findings to make recommendations for improving the health services of the area.

The Public Health Service has assigned one medical officer to cooperate with the Committee on Records and Reports of the State and Provincial Health Authorities of North America. Under the direction of the committee, this officer is engaged in rendering a consultation service to the States on records and reports. The purpose of this service is to assist States in effecting a saving of time and effort in record keeping by discarding unnecessary report forms and by eliminating the duplication of identical items of information on different forms.

The 6 district offices of the Public Health Service, with assistance from the central office, have been participating in the collection of field data to be used in preparing a revision of Public Health Service Bulletin 184. This Bulletin is a comprehensive report on the organization, functions, expenditures, and other features of State health departments throughout the United States. The publication contains a wealth of health information, but the present edition is outdated and the revision will serve a very useful purpose.

COOPERATION WITH OTHER AGENCIES IN THE ADMINISTRATION OF MEDICAL CARE PROGRAMS

Several Federal agencies and departments, including the Social Security Board, the Department of Interior, and the Department of Agriculture, have requested and received the services of Public Health Service officers to administer programs of medical care and related services. During the past fiscal year 5 officers were assigned to the several agencies on details of this type. One officer was detailed to the Social Security Board to act as consultant on the medical phases of the program of aid to the blind under title X of the Social Security Act, and also to act as consultant to the Board on programs of medical

care proposed and operated by the welfare departments in the several States. Two medical officers were assigned to the Farm Security Administration of the Department of Agriculture, one acting as chief medical officer and the other serving as assistant medical officer in the field. These officers are engaged in the development of medical care programs and in the promotion of environmental sanitation for about 80,000 low-income farm families aided by the several programs of the Farm Security Administration. One medical officer is assigned to the State of Washington and is engaged in studying the problem of medical care among the medically indigent and in developing a program of medical care in that State. One medical officer is assigned to the State of Minnesota for the purpose of assisting in the study of tuberculosis control methods.

While not a specific function of the Division of Domestic Quarantine, another cooperative activity of the Service in the field of medical care is the supervision of control of communicable diseases among the Indians and the administration of a medical care program for them. Eight Service officers are detailed to the Department of the Interior, Office of Indian Affairs, to supervise the central office and the 6 field offices, which administer the medical care program for the Indians. Offices are maintained at Washington, D. C.; Albuquerque, N. Mex.; Juneau, Alaska; Minneapolis, Minn.; San Francisco, Calif.; Spokane, Wash.; and Tahleah, Okla.

PLAGUE CONTROL ACTIVITIES

PLAGUE SUPPRESSIVE MEASURES IN WESTERN STATES

Field surveys to locate plague foci.—To determine the areas infected by rodent plague and to study the epidemiology of the infection, the Public Health Service Laboratory in San Francisco continued to collect samples of rodent populations and animal ectoparasites. Four field parties, using mobile laboratories mounted on trucks, collected 26,904 small animals and 105,762 ectoparasites in 9 western States during the summer months. The animals collected were examined by autopsy methods in the field, and tissue specimens were taken from any animal presenting lesions suggestive of plague. Sixty-five tissue specimens so obtained, together with all ectoparasites, were sent to the San Francisco Public Health Service Laboratory for inoculation tests. Pooled specimens of ectoparasites are injected into laboratory animals to determine the presence or absence of plague. The State Health Departments of Montana, Oregon, and Washington collected specimens in a similar manner and transmitted 17,168 ectoparasites and 17 specimens of tissue obtained from 7,660 animals to the San Francisco Laboratory.

Plague in wild rodents and related animals.—Plague infection was found in 22 of the specimens sent to the Public Health Service Laboratory. These had been collected in 10 counties in 6 States. In 4 of these counties plague had not been previously reported. The distribution of the plague-positive specimens by counties, hosts, and parasites is shown in table 6.

TABLE 6.—Location of plague infected foci and animals among which evidence of infection was found during the period July 1, 1939, to June 30, 1940

State	County	Species of wild rodents found plague infected	Material and number of specimens found infected			
			Fleas	Lice	Ticks	Tissue
Montana.....	Beaverhead.....	<i>Citellus columbianus</i>	2			
Do.....	do.....	do.....			1	
Nevada.....	Elko.....	<i>Citellus beldingi oregonus</i>				2
Do.....	do.....	do.....	1			
Do.....	do.....	<i>Citellus richardsonii nevadensis</i>				1
New Mexico.....	Valencia ¹	<i>Cynomys gunnisoni zuniensis</i>	2			
Oregon.....	Lake.....	<i>Marmota flaviventris</i>				1
Do.....	Malheur ¹	<i>Citellus oregonus</i>	1			
Do.....	Wallowa.....	do.....	1			
Washington.....	Lincoln.....	<i>Citellus washingtoni</i>	2			
Do.....	Spokane.....	<i>Citellus columbianus</i>	4			1
Do.....	do.....	<i>Sylvilagus nuttali</i>	1			
Wyoming.....	Park ¹	<i>Marmota flaviventris</i>		1		
Do.....	Sweetwater ¹	<i>Cynomys leucurus</i>	1			
Total specimens plague infected.			15	1	1	5

¹ First reported plague in this county.

The California State Department of Public Health reported that during the year plague was found in 3 specimens of fleas from ground squirrels taken in 2 counties. In the 11 western States the total number of plague-positive specimens reported by all agencies during the year was 25. These were distributed in 12 counties in 7 States. No extensive epizootic of the disease was observed and no new species of animals were involved. For the second time plague was found naturally occurring in a rabbit.

Plague in man.—One nonfatal case of the disease was reported in a farmer residing in Millard County, Utah.

Bacteriological studies of plague.—A laboratory study of the cultural and serologic characteristic of a number of strains of *B. pestis* was begun at the laboratory in San Francisco.

Parasite studies.—Nearly 115,000 fleas and other ectoparasites collected from small animals were received at the laboratory for identification and inoculation tests. The Public Health Service Laboratory now has a large amount of data concerning the distribution of animal parasites in the western States. A catalogue of the Siphonaptera of North America, north of Mexico, is in the process of completion. This catalogue will include about 225 species and subspecies of fleas. The collection of mounted specimens of parasites was increased by nearly 3,500 specimens.

PLAGUE CONTROL ACTIVITIES IN CITIES

In cooperation with the San Francisco Health Department, rats and ground squirrels in that city are trapped for the purpose of determining the presence of any infection in the rodents that might endanger

the health of the public. Property owners are advised concerning measures for the correction of rat nuisance. In San Francisco 3,087 complaints of rat infestation were investigated and corrective measures advised. During the year, 29,692 rats and 73 ground squirrels were obtained and examined by autopsy methods for evidence of plague. As a sample, 25,181 fleas were taken from 1,929 of these rodents and used in inoculation tests. No evidence of plague was found in any of these rodents.

At the request of the State Health Officer of Idaho, a survey of the rodent population of the city of Lewiston was made, and no plague-infected rats were found. A similar survey of the rodents in Denver, Colo., was contemplated.

PLAGUE CONTROL, TERRITORY OF HAWAII

In cooperation with the Territorial Board of Health, the Public Health Service has continued operation of plague control programs in the Islands of Hawaii and Maui. In Hawaii the purpose of the program is threefold: (1) To reduce the rodent population and thus prevent the spread of plague among rodents; (2) to locate and eliminate foci of rodent plague in infected areas; and (3) by ratproofing and other measures to keep rats out of built-up areas. Success is being attained in all three directions, and the work of another year should produce a marked improvement in the plague situation in this area. On the Island of Maui the program is directed toward the maintenance of the rat population at its present low level by baiting, trapping, and ratproofing.

No case of human or rodent plague has been found on Maui for over 2 years. However, it cannot be said that rodent plague is nonexistent on this island until considerable mass inoculation and flea work is done. On the Island of Hawaii 1 case of human plague was reported, and 47 plague infected rodents were found. The case of human plague and all the cases of rodent plague occurred in the Hamakua District.

The banana-phosphorus bait has been quite successful in Hawaii. The reduction of the rodent population in the Hamakua area continues with no evidence yet that a minimum level has been reached. The population is 50 percent lower than that recorded by any other previous index and is 75 percent lower than at the time the new bait was introduced. On Maui, however, there is reason to believe that the rats inhabiting the pineapple fields are not being attracted to the banana-phosphorus bait. A thallium sulfate rolled barley bait has been developed and is being used experimentally. Preliminary results indicate that the rats are attracted more readily to the new bait.

The work accomplished in plague control in the Islands of Maui and Hawaii is summarized in table 7.

TABLE 7.—Summary of plague control activities, Islands of Maui and Hawaii, T. H., fiscal year ended June 30, 1940

	Hawaii	Maui	Total
Number of rats trapped.....	65,155	18,110	83,265
Number of rats killed by gassing, shooting, clubbing, etc.....	1,641	1,432	3,073
Number of rats found dead.....	4,808	101	4,909
Number and classification of rodents destroyed as:			
<i>R. hawaiiensis</i>	30,664	14,825	45,489
<i>R. alexandrinus</i>	21,009	2,464	23,473
<i>R. rattus</i>	2,047	1,255	3,302
<i>R. norvegicus</i>	17,527		17,527
Unclassified.....		1,099	1,099
<i>M. musculus</i>	45,518	11,663	57,181
Mongoose.....	279	29	308
Number of mice trapped.....	47,918	11,602	59,520
Number of mice found dead.....	563	58	621
Number of rats received at laboratory.....	71,607	19,379	90,986
Total rodents received at laboratory.....	120,125	31,043	151,168
Number of burrows and rock piles treated.....	8,228		8,228
Number of pieces of poison bait placed.....	1,603,435	624,422	2,227,857
Number of pounds of thallium sulfate treated barley.....		454½	454½
Number of rats examined macroscopically.....	66,400	15,417	81,817
Number of rats examined microscopically.....	101	529	630
Number of single inoculations.....	72		72
Number of mass inoculations.....	67	69	136
Number of cases of rodent plague.....	47		47
Number of cases of human plague.....	1		1

Date of last case of human plague, Island of Maui, Dec. 29, 1937.

Date of last case of rodent plague, Island of Maui, Dec. 16, 1937.

Date of last case of human plague, Island of Hawaii, Dec. 23, 1939.

Date of last case of rodent plague, Island of Hawaii, June 28, 1940.

PUBLIC HEALTH SERVICE LABORATORY, SAN FRANCISCO

The laboratory in San Francisco performs work in serology and bacteriology for other Public Health Service stations in the western district, including examination of water used on interstate carriers, in national parks, and in Indian Service reservations. The number of serologic tests having grown to considerable proportions, a senior medical technician was transferred to the laboratory from the Venereal Disease Research Laboratory, Stapleton, N. Y., to perform these tests in conformity with the latest developments in serology and to develop a training station for technicians.

During the year the laboratory examined for evidence of plague, 29,918 rodents obtained in or near San Francisco. Animal inoculation tests on material secured by field parties numbered 3,351. Serologic tests reached the total of 27,395; 675 samples of water were examined and 142 miscellaneous laboratory procedures were performed.

In cooperation with the California State Health Department, space in the Public Health Service Laboratory has been released to the State and the latter has provided personnel and equipment for a study of trichinosis in California. This work is now under way and will be continued through the next fiscal year. A complete epidemiological survey will be made of each case of human trichinosis reported. It is further planned to determine the incidence of asymptomatic infection by the post-mortem examination of sections of human diaphragms.

PUBLIC HEALTH SANITATION ACTIVITIES

Activities relating to environmental sanitation have continued to be administered under the direction of the Sanitation Section. The work of this section has been expanded during the year to include all

Public Health Service activities relating to the practical application of environmental sanitation principles. The general work of the section is carried on through administrative headquarters in Washington, D. C.; in district offices at New York, N. Y.; Washington, D. C.; Chicago, Ill.; New Orleans, La.; and San Francisco, Calif. Offices at Cincinnati, Ohio; Pittsburgh, Pa.; Chattanooga, Tenn.; and Vincennes, Ind., are maintained for special activities.

The work of the section falls into three general classifications: (1) Cooperation with the States in the enforcement of the Interstate Quarantine Regulations; (2) cooperation with and assistance to other Federal agencies and State departments of health in connection with matters pertaining to sanitary engineering and environmental sanitation; and (3) supplying information relative to environmental sanitation through the preparation and distribution of the public health engineering abstracts and general correspondence.

ENFORCEMENT OF THE INTERSTATE QUARANTINE REGULATIONS

The chief responsibility of the Sanitation Section is that of enforcing, with the cooperation of the State health departments, the Interstate Quarantine Regulations for drinking and culinary water used on interstate carriers, interstate carrier sanitation, and sanitary control of the shellfish industry.

Supervision of water supplies used by common carriers.—During the calendar year 1939, the carriers operating in interstate traffic listed for use and requested certification of 1,806 water supplies, of which 1,498, or 83 percent, were public supplies. The remainder were owned by the carrier, by private corporations, or by individuals. Of these supplies, 1,174, or 65 percent, were certified favorably both as to the supply itself and as to the manner of handling the water by the carrier. Owing to undesirable features not of immediate or extremely serious nature, 542, or 30 percent, were permitted to be used provisionally, pending improvements; 53, or 3 percent, were prohibited for use; 37 supplies, or 2 percent, remained unreported upon at the close of the calendar year.

As a result of increased engineering personnel, the State departments of health conduct most of the field surveys of water supplies with only general supervision by Public Health Service engineers. In isolated instances involving unusual conditions, it is still necessary for the Public Health Service to act directly. However, 1,769 descriptive reports on these water supplies and 2,515 reports on methods of handling the water at loading points were carefully reviewed by engineers of the district offices prior to certification. This activity involved the issuance of 3,884 certificates.

Vessel sanitation.—Of the 1,722 vessels listed as interstate carriers, 1,130, or 65.5 percent, were inspected during the year. Approved certificates were issued to 1,124, or 65.2 percent. "Not approved" certificates were issued to 6 vessels because of the manner in which water for drinking and culinary purposes was handled, stored, or dispensed. Pending inspection, temporary certificates were issued to 381 vessels on the basis of masters' affidavits as to compliance with the regulations. Owing to insufficient personnel and to the difficulty in locating the vessel, no inspections were made nor was action taken on 211, or 12.3 percent, of the vessels listed. During the year, 180 inspections of

passenger-carrying vessels, 983 of freighters, and 27 of water barges were made. Forty-two sets of plans of vessel water systems were reviewed and 29 approved for installation.

The local health departments of several cities continued to cooperate in the bacteriological examination of samples of water collected from vessels operating interstate. During the fiscal year 285 reports of examination of such samples were received.

Although 29 cases of typhoid fever among seamen were reported by the Public Health Service hospitals or relief stations, only a few involved interstate carrier vessels, and these were single cases widely scattered, with no indication that infection was derived from conditions existing on the vessel.

Shipbuilding developments, which promise to increase for the next few years under the general direction of the United States Maritime Commission, have stimulated the submission of plans for water storage, treatment, and distribution on shipboard to the Public Health Service for review and approval prior to installation. This is distinctly encouraging in that it creates a tendency toward consistency in requirements regardless of whether the vessel is to be operated in domestic or foreign trade.

Railway, air-carrier, and motorbus sanitation.—During the fiscal year, progress has been made in inspectional functions with respect to water-handling equipment and practices at loading points. Practically all of the States are now performing this function after training has been afforded State personnel by district personnel of the Public Health Service. The Service continued to assist in this work, particularly in connection with the inspection of the larger watering points, railway coach yards and terminals, 106 such inspections having been made. This has included air lines as well as motorbus transportation systems. As a rule, excellent cooperation on the part of the transportation companies has been given the State and Federal authorities in the improvement of watering facilities.

With the increase in the number of communities throughout the country adopting the Milk Ordinance recommended by the Public Health Service and with the gradual increase in availability of grade A pasteurized milk, Service district personnel, in cooperation with State health departments, have been able to assist the interstate carriers in their compliance with section 29 (E) of the Interstate Quarantine Regulations. Insofar as practicable, the carriers have been required to take milk and milk products from sources with at least 90 percent compliance with the Milk Code recommended by the Public Health Service. During the fiscal year, 257 dining car inspections were made and 32 railway commissaries were visited.

As a result of the tendency to include in streamlined cars facilities for filtration and dechlorination of drinking and culinary waters, a study has been initiated to determine the extent of the use of such equipment and the potential hazards involved.

Shellfish sanitation.—Activities relating to the sanitary control of the shellfish industry have continued along the same general lines as in previous years, the Public Health Service acting as a coordinator and as a clearing house for information for the health authorities of the producing and consuming areas throughout the country. Observations have been made of methods of producing, processing, and marketing of oysters, clams, and mussels in each producing State to

determine the relative safety of such practices. Assistance was rendered to several States in the sanitary and bacteriological survey of shellfish-growing areas. Engineers of the district offices made 1,042 inspections of shellfish-handling establishments and 266 inspections of growing areas. As a result of these activities it was possible to endorse 2,017 of the 2,212 certificates submitted by State departments of health. Unfortunately, one State has continued deficient in sanitary control measures, and consequently its certification of dealers could not be endorsed. State laboratories made bacteriologic examinations of 3,800 samples of water and of oysters, the greater part of which were collected in connection with surveys of oyster-growing areas. The semimonthly publication of lists of dealers certified by the State has been continued by the Public Health Service in order to inform health officials throughout the United States and Canada as to dealers supplying shellfish from sources of relative safety.

On December 15, 1939, the Surgeon General's office invited the attention of all shellfish-producing States to the necessity of placing greater restrictions upon the water storage or "floating" of oysters and clams owing to the potential hazards of this practice, as exemplified by a study of shellfish-borne disease outbreaks in the past.

The district personnel have maintained contact with the several oyster and clam cleansing plants operated in some of the Atlantic Coast States in order to judge the efficacy of this treatment for shellfish taken from moderately polluted areas.

The significance of bacteriological examinations of shucked oysters was the subject of discussion during the year among several East Coast States. As a result, a research study has been undertaken jointly by the Public Health Service and the Virginia State Department of Health, utilizing an experimental laboratory provided for this purpose at the Quarantine Detention Station, Craney Island, Va.

RECIPROCITY WITH CANADA

Mutually valuable contact was continued with the Department of Pensions and National Health of the Dominion of Canada, particularly with respect to the supervision of the drinking and culinary water supplies used by transportation lines operating in international traffic. The Canadian department transmitted to the Public Health Service reports and recommendations on 24 water supplies used by United States carriers operating in Canada, and the Public Health Service reported upon 80 water supplies located in the United States and used by Canadian carriers whose operations extended to points in this country. This cooperative policy between the two countries has not been confined to the safety of the water supplies but has also included the methods of handling, storing, and distributing water on railroad equipment operating across the border and on vessels plying the Great Lakes.

Furthermore, the Canadian health authorities have been kept informed concerning matters of shellfish sanitation in the United States to the extent of forwarding to Canada copies of all shellfish shippers' certificates issued by the States and endorsed by the Public Health Service. In turn, the Canadian authorities submitted to the Public Health Service 37 certificates of approved Canadian shellfish shippers who ship to the United States.

SANITATION CODES

The development of model ordinances and codes on different phases of environmental sanitation for voluntary adoption by States and communities has been continued. As a result of the wide and successful experience with the recommended milk ordinance and code, there has been a demand for the preparation of similar codes covering other fields of sanitation.

A new edition of the Milk Ordinance and Code was printed in February 1940 as Public Health Bulletin No. 220 (1939 edition). The milk ordinance recommended by the Public Health Service is reported to be in effect in over 2,300 communities located in 34 States.

Following an intensive study of typical existing regulations pertaining to the manufacture and sale of ice cream and to plants manufacturing ice cream, a first draft of a frozen desserts ordinance was prepared in 1937. After conferences with a special advisory committee and several industrial groups, three successive drafts were prepared for consideration by the Sanitation Advisory Board at its meetings in 1938, 1939, and 1940. A recommended Frozen Desserts Ordinance and Code finally has been approved and published in mimeographed form under date of May 1940.

At the request of many health officers for advisory regulations on restaurant sanitation, and after a careful study of the ordinances of typical cities and field studies of restaurants, a tentative draft of an Ordinance and Code Regulating Eating and Drinking Establishments was issued in mimeographed form in March 1938. This was presented in amended form for the consideration of the Sanitation Advisory Board in 1940, and a recommended ordinance and code was issued in mimeographed form in June 1940.

Preparation of advisory sanitation standards covering the growing, gathering, processing, and shipping of shellfish has been undertaken and a preliminary draft is nearing completion. These standards may possibly be incorporated in a recommended shellfish code.

In order to bring about a more uniform procedure for the sanitary inspection of vessels and to clarify certain features of policy, a code covering this activity is in preparation.

Suggested standards of water sanitation were prepared in rough draft in 1938 with the aid of a special advisory committee. During the past few months intensive study has been devoted to the preparation of a tentative draft of the standards for ground water supplies. These standards may possibly be incorporated in a recommended water code.

As the need for uniform regulations covering the sanitation of milk and milk products used for manufacturing purposes was recently recognized by the Midwest Regional Conference, called by the Council of State Governments, the Sanitation Advisory Board has suggested the preparation of a recommended code by the Public Health Service. This will be undertaken in the near future.

STREAM SANITATION

The major activities of the Division in stream sanitation during the fiscal year 1940 have consisted almost entirely of special stream pollution surveys in cooperation with the Corps of Engineers of the United

States Army. These surveys, studies, and investigations included the pollution survey of the Ohio River watershed and studies on the North Canadian and Grand (Neosho) Rivers.

During July, a memorandum was prepared on activities in connection with the survey of New York Harbor being conducted by the Work Projects Administration under the sponsorship of the Interstate Sanitation Commission of New York and New Jersey. Reports on the work to the end of 1938, covering various phases of the activities, were reviewed and recommendations were made covering future activities and allotments to complete the survey as previously planned.

Ohio River Pollution Survey.—The Ohio River Pollution Survey authorized by the Rivers and Harbors Act, approved August 26, 1937, has been continued as a cooperative investigation between the Public Health Service and the Corps of Engineers, United States Army, under the general direction of the Ohio River Committee appointed by direction of the President.

The stream pollution investigations station of the Public Health Service, working in cooperation with the several State health agencies, municipalities, and other agencies, has secured information on the sources and amounts of pollution and its effects.

These data have been obtained from the various State health agencies and by field surveys of water supplies, sewage, and industrial waste disposal. Chemical and bacteriological examinations have been made from base shore or floating laboratories along the main stream, supplemented by mobile trailer laboratory units for studies on the tributary streams.

The survey of the middle third of the Ohio River watershed, composing about 50,000 square miles, lying between and including the drainage areas of the Kanawha and Kentucky Rivers, was completed in January 1940. In April 1940, an interim report was submitted to the Ohio River Committee. The report summarized the laboratory findings, sources of pollution data, and hydrometric studies, indicating the sanitary condition of the streams studied, and set forth recommendations for the restoration of these streams to the conditions for which they seemed best suited.

Plans revised in February 1940 called for the extension of the survey into the upper and lower portions of the basin during 1940. Additional personnel, equipment, and supplies are being obtained for the increased activities necessary to complete the program in 2 years rather than in 3 as originally planned.

At the close of the fiscal year, it was estimated that the investigations of water supplies and sewage disposal facilities for the entire watershed were approximately 50 percent completed and the industrial waste investigations approximately 43 percent finished. In the field surveys of sources and amounts of pollution, 1,403 water supply investigations and 1,403 sewage disposal studies have been made; about 773 manufacturing establishments have been visited to determine amounts and effects of industrial waste discharge.

Investigations to determine the effects of the present pollution being discharged into the various watercourses under the conditions existing at the time of sample collection have necessitated analyses of 36,200 water samples involving some 65,700 laboratory determinations.

Collection of information on and epidemiological studies of outbreaks of diarrhea and gastroenteritis and their possible relation to polluted water used as sources of public water supply has been continued during the fiscal year.

Material relative to Service activities in connection with the survey has been prepared and presented before many technical and civic organizations in the area. A motion picture in color depicting types and effects of pollution and methods of sewage and industrial waste treatment has aided materially in the presentation of these activities.

North Canadian River survey.—During the period September–December 1939, inclusive, a special field investigation was conducted in cooperation with the District Engineer of the United States Army Corps of Engineers at Tulsa, Okla., and the Oklahoma State Health Department. The purpose of the survey was to determine: (1) The amount and value of water which might be supplied in connection with proposed flood control reservoirs on the North Canadian River, for pollution abatement, mainly below Oklahoma City; and (2) the effect of water storage on the quality of the public water supply of Oklahoma City. The report on the investigation was completed in January 1939.

Grand (Neosho) River survey.—An investigation of the Grand (Neosho) River in Kansas, Oklahoma, Missouri, and Arkansas was made during May and June 1940, in cooperation with the District Engineer of the United States Army Corps of Engineers at Tulsa, and the State health authorities of the 4 States, portions of which are located on the watershed.

The purpose of this investigation was to determine the amount of water available and its value for water supply purposes and pollution abatement. This information was necessary in planning proposed flood control measures on the Grand (Neosho) River involving flood control and multiple-purpose reservoirs.

COOPERATIVE WORK WITH STATES IN PUBLIC HEALTH ENGINEERING

In collaboration with the regional medical consultants of the Public Health Service, the district engineers and members of their staffs have assisted the various State sanitary engineering divisions. This assistance has been given principally in connection with the development or expansion of State environmental sanitation activities made possible by the allotment of funds under title VI of the Social Security Act. Studies of a comprehensive nature were made of 24 State sanitary engineering divisions.

In response to requests of State departments of health, district engineering personnel participated in detailed environmental sanitation surveys of several of the larger cities of the country. Assistance was given the States in the study of the prevalence of trichinosis and certain gastrointestinal disease outbreaks. Additional cooperation with the States has taken the form of participation in, and in some cases development of, periodic conferences and short courses for water works and sewage plant operators and general sanitation personnel.

Advisory service in milk sanitation.—Many requests from State and local health departments were received and field consultation services given embracing technical advice on milk sanitation, assistance in the

organization of State milk programs, and training of personnel. Five milk sanitation seminars were conducted in cooperation with State and local health departments in the following localities: Minneapolis, Minn.; St. Louis, Mo.; Dallas, Tex.; Seattle, Wash.; and Ames, Iowa. These seminars were attended by 485 milk control officials.

On December 1, 1939, administrative supervision of the field milk specialists was transferred from the central office to the district engineers. Field consultation service on milk sanitation was rendered to 30 States. Assistance was also given the Council of State Governments in connection with the Midwest Regional Conference on dairy problems.

Many milk sanitation rating reports submitted by State health departments were computed, checked, and photostated. Lists of communities awarded milk sanitation ratings of 90 percent or more were published twice during the year in the Public Health Reports.

A more intensive program for the control of milk supplies used on interstate carriers, in accordance with the Interstate Quarantine Regulations, was inaugurated in cooperation with State health departments and carriers concerned.

COOPERATION WITH OTHER FEDERAL AGENCIES

During the fiscal year, 1,040 man-days were devoted to consultant service rendered various agencies of the Federal Government. This included in some instances the design of sanitary structures such as water and sewage treatment plants and incinerating equipment, while in others it has taken the form of review of designs and recommendations. A fair portion of this time was devoted to problems of operation of water and sewage treatment devices.

As a consequence of the expanding national defense program, the Sanitation Section rendered cooperative service to the United States Army and various State departments of health in connection with the sanitation of areas in parts of Louisiana and Texas occupied by troops during war maneuvers held during the spring of 1940. Cooperation was also rendered the National Park Service, the United States Office of Indian Affairs, the National Forest Service, the Bureau of Prisons, the United States Lighthouse Service, the Civil Aeronautics Authority, the Tennessee Valley Authority, the National Resources Planning Board, the Procurement Division of the Treasury Department, the United States Navy, the District of Columbia, and numerous Federal offices located in Washington.

Mosquito control in the District of Columbia.—Supervision of mosquito control activities in the District of Columbia was discontinued at the end of the last fiscal year for lack of funds and was not resumed until December 5, 1939, when funds became available making supervision possible to June 30, 1940. Mosquito control activities were divided into two separate programs: (1) Oiling of catch basins, streams, and ponds as a regular District of Columbia Sewer Division activity, and (2) a Work Projects Administration project for ditch paving and the removal of water chestnut and other aquatic growths from Oxon Run Bay and the Potomac River. Altogether 5,060 square yards, or 5,695 linear feet, of ditch paving were installed, and 200 acres

of water chestnut which had been cut by the Army Engineers were removed by the Work Projects Administration to prevent reseeding. Arrangements were completed with the Navy Department for dusting with paris green those areas in Oxon Run Bay and the Potomac River from which water chestnut had not been removed.

Water resources committee.—An engineer officer of the Public Health Service has continued to serve as a member of the Water Resources Committee of the National Resources Planning Board, and the district engineers of the Service have continued as members of the various drainage basin committees established by the Board.

Potomac Valley Conservancy District.—An engineer officer of the Public Health Service served during the year as the Federal representative in connection with the negotiations leading to the adoption of a compact by the States of Maryland, Pennsylvania, West Virginia, Virginia, and the District of Columbia for the control and abatement of the pollution of the Potomac River and its tributaries. Favorable action on this compact has been taken by the legislatures of the States of Maryland and Virginia and the Commissioners of the District of Columbia. The compact received the approval of the Seventy-sixth Congress and as Public Resolution No. 93 was approved by the President on July 11, 1940.

Work Projects Administration.—In 1933, when the Civil Works Administration inaugurated its work program, the Public Health Service recommended the following types of projects, which were considered desirable from the standpoint of public health and community welfare:

1. Community sanitation: Elimination of insanitary devices for the disposal of human discharges by the construction of sanitary privies in rural areas and suburban territories where sewer systems are not economically practicable;
2. Malaria control: Drainage of swamps and ponds to eliminate malaria mosquito breeding areas;
3. Sealing of abandoned bituminous coal mines: Reduction of the acid pollution of streams which has a detrimental effect on the use of the streams for water supplies.

Accordingly, the above projects were incorporated into the Civil Works Administration program and have been included in the emergency work relief programs that followed. These projects are now being carried on as Work Projects Administration undertakings.

In order that these projects might be given proper technical supervision and to insure that maximum public health benefits would accrue from the expenditures made, special allotments have been made to the Public Health Service for the employment of technical supervisory personnel which have been allocated to each State health department on the basis of existing needs.

A further decreased allotment for the fiscal year 1940 made reductions in supervisory personnel necessary and required that the State health departments assume greater responsibility in providing technical supervision and in promoting the work.

These projects are initiated and sponsored by the State health departments but must be reviewed and approved by the Public Health Service before action is taken by the Work Projects Administration.

The public health value of the above projects has been proved and the continuation of these activities is advocated.

Community sanitation.—Community sanitation projects were operated in approximately 1,025 counties in 38 States, on which an average of approximately 13,850 relief workers were employed in the construction of 328,570 sanitary privies during the fiscal year 1940.

Tables 8 and 9 show the results accomplished for the fiscal year 1940, and from the beginning of the program in 1933 under the Civil Works Administration, Emergency Relief Administration, Works Progress Administration, and the Work Projects Administration through June 30, 1940.

TABLE 8.—Average number of counties in which W. P. A. community sanitation projects were in operation, average number of workers employed, number of sanitary privies installed, and the number and percentage which were of the concrete slab type, by States, during the period July 1, 1939, to June 30, 1940

[Compiled from reports submitted by various State health departments]

State	Counties			Average number of workers employed	Total number of privies installed	Total number concrete	Percentage concrete
	Total number in State	Average number operating	Percentage operating				
Alabama.....	67	23	34.0	552	6,518	6,518	100.0
Arizona.....	14	13	92.9	167	3,913	3,863	98.7
Arkansas.....	75	13	17.3	169	3,388	3,388	100.0
California.....	58	7	12.1	153	1,861	1,861	100.0
Colorado.....	63	23	36.5	275	5,286	5,286	100.0
Delaware.....	3	2	66.7	23	383	383	100.0
Florida.....	67	26	38.8	281	6,224	5,193	83.4
Georgia.....	159	40	25.2	397	10,402	8,562	82.3
Idaho.....	44	12	27.3	130	1,459	1,437	98.5
Illinois.....	102	40	39.2	584	11,422	11,422	100.0
Indiana.....	92	92	100.0	433	9,630	9,630	100.0
Iowa.....	99	6	6.1	46	743	743	100.0
Kansas.....	105	31	29.5	382	5,879	5,879	100.0
Kentucky.....	120	14	11.7	211	3,780	3,780	100.0
Louisiana.....	64	31	48.4	419	10,589	5,697	53.8
Maryland.....	23	5	21.7	91	1,959	1,856	94.7
Mississippi.....	82	71	86.6	1,020	30,041	30,036	99.9
Missouri.....	114	6	5.3	113	1,412	1,412	100.0
Montana.....	56	13	23.2	144	2,160	2,160	100.0
Nebraska.....	41	41	100.0	401	6,291	6,291	100.0
Nevada.....	17	5	29.4	60	834	834	100.0
New Jersey.....	21	18	85.7	245	5,046	5,046	100.0
New Mexico.....	31	8	25.8	113	2,545	2,545	100.0
North Carolina.....	100	44	44.0	773	25,608	25,608	100.0
North Dakota.....	53	39	73.6	277	4,646	4,646	100.0
Oklahoma.....	77	42	54.5	317	8,003	8,003	100.0
Oregon.....	36	15	41.7	165	2,531	2,451	96.8
Pennsylvania.....	67	53	79.1	680	12,833	12,833	100.0
South Carolina.....	46	42	91.3	559	19,845	19,845	100.0
South Dakota.....	69	32	46.4	356	9,133	9,133	100.0
Tennessee.....	95	71	74.7	1,412	40,124	22,947	57.2
Texas.....	254	39	15.4	833	14,393	14,393	100.0
Utah.....	29	9	31.0	200	3,976	3,976	100.0
Virginia.....	100	11	11.0	151	6,597	3,770	57.1
Washington.....	39	6	15.4	107	1,465	1,405	95.9
West Virginia.....	55	54	98.2	1,473	43,373	43,373	100.0
Wisconsin.....	71	18	25.4	29	2,826	2,826	100.0
Wyoming.....	23	6	26.1	95	1,452	1,452	100.0
Total (38 States).....	2,683	1,021	38.1	13,836	328,570	300,483	91.5

TABLE 9.—Number of privies installed in each State from week ending Dec. 16, 1933, to June 30, 1940, under C. W. A., E. R. A., and W. P. A. programs

(Compiled from reports submitted by various State health departments)

State	Privies installed under W. P. A. program			Privies installed under C. W. A. and E. R. A. programs	Total privies installed under C. W. A., E. R. A., and W. P. A. programs to June 30, 1940
	July 1, 1935, to June 30, 1939	July 1, 1939, to June 30, 1940	Total, July 1, 1935, to June 30, 1940		
Alabama.....	21,640	6,518	28,158	3,256	31,414
Arizona.....	15,790	3,913	19,703	250	19,953
Arkansas.....	48,104	3,388	51,492	27,548	79,040
California.....	20,657	1,861	22,518	1,872	24,390
Colorado.....	20,677	5,286	25,963	-----	25,963
Delaware.....	2,321	383	2,704	168	2,872
Florida.....	17,411	6,224	23,635	9,187	32,822
Georgia.....	36,676	10,402	47,078	19,687	66,765
Idaho.....	15,122	1,459	16,581	-----	16,581
Illinois.....	45,150	11,422	56,572	2,801	59,373
Indiana.....	82,551	9,630	92,181	25,228	117,409
Iowa.....	9,285	743	10,028	376	10,404
Kansas.....	42,262	5,879	48,141	8,037	56,178
Kentucky.....	53,672	3,780	57,452	18,006	75,458
Louisiana.....	38,964	10,589	49,553	41,763	91,316
Maryland.....	10,749	1,959	12,708	6,481	19,189
Massachusetts.....	(1)	(1)	(1)	-----	-----
Michigan.....	(2)	(2)	(2)	3,016	3,016
Minnesota.....	(3)	(3)	(3)	-----	-----
Mississippi.....	97,621	30,041	127,662	23,227	150,889
Missouri.....	1,264	1,412	2,676	5,321	7,997
Montana.....	13,080	2,160	15,240	124	15,364
Nebraska.....	26,420	6,291	32,711	-----	32,711
Nevada.....	2,065	834	2,899	-----	2,899
New Jersey.....	16,910	5,046	21,956	-----	21,956
New Mexico.....	13,603	2,545	16,148	409	16,557
North Carolina.....	112,521	25,608	138,129	62,089	200,218
North Dakota.....	25,988	4,646	30,634	443	31,077
Ohio.....	(4) 62,186	-----	62,186	15,671	77,857
Oklahoma.....	76,810	8,003	84,813	26,534	111,347
Oregon.....	13,241	2,531	15,772	-----	15,772
Pennsylvania.....	47,020	12,833	59,853	963	60,816
South Carolina.....	84,074	19,845	103,919	39,621	143,540
South Dakota.....	26,681	9,133	35,814	-----	35,814
Tennessee.....	144,898	40,124	185,022	43,778	228,800
Texas.....	53,754	14,393	68,147	70,370	138,517
Utah.....	23,703	3,976	27,679	2,052	29,731
Virginia.....	128,601	6,597	135,198	26,330	161,528
Washington.....	11,975	1,465	13,440	796	14,236
West Virginia.....	169,460	43,373	212,833	75,869	288,702
Wisconsin.....	13,597	2,826	16,423	-----	16,423
Wyoming.....	4,805	1,452	6,257	-----	6,257
Total.....	1,651,308	328,570	1,979,878	561,273	2,541,151
Average per month.....	34,402	27,380	32,998	-----	-----
Installed from July 1, 1938, to June 30, 1939.....	-----	437,892	-----	-----	-----
Average per month.....	-----	36,491	-----	-----	-----

¹ Discontinued June 30, 1936.² Discontinued Nov. 15, 1935.³ Discontinued Apr. 30, 1936.⁴ Discontinued Feb. 28, 1939.

Malaria control drainage.—An increasing amount of the drainage work done near centers of population has been the installation of the so-called permanently lined ditches. Ditches lined with concrete, stone, brick, or even stabilized by sodding, are more costly to construct but require a minimum of maintenance over many years; hence they are actually more economical. Where permanently lined ditches are economically practicable, their installation is a distinct forward step in the application of malaria control methods. Permanent

types of ditch construction are approved by the Work Projects Administration.

Reports received from the 16 States participating in these projects indicate that during the fiscal year 1940, approximately 1,350 miles of malaria control ditches were constructed. To date, 647 miles of permanently lined ditches have been installed. An average of 14,071 men were employed monthly; 22,000 acres of anopheles producing water areas were eliminated, thus providing malaria protection for approximately 340,000 people.

The total amount of ditch construction with relief labor since the beginning of the Civil Works Administration is approximately 34,000 miles.

Sealing of abandoned coal mines.—Technical supervisory assistance has been extended in a varying degree by the Public Health Service. During the past year budgetary requirements reduced direct support by the Public Health Service to a general consulting service to State health departments and the Work Projects Administration with restricted application to local detail. Field contact offices have been maintained at Chattanooga, Tenn.; Vincennes, Ind.; and Pittsburgh, Pa. An assistant engineer has been stationed at each office under the direction of a regional consultant, with headquarters at Pittsburgh, Pa.

The object of the undertaking has been the abatement of the mine drainage pollution of streams within the States of Maryland, Pennsylvania, West Virginia, Ohio, Indiana, Kentucky, Tennessee, and Alabama. Work in Kentucky and Pennsylvania was suspended in the summer of 1938 and has not been resumed, although much work remains. Work in Illinois was completed in the spring of 1939. Activity has been maintained in Maryland, West Virginia, Ohio, Indiana, Tennessee, and Alabama throughout the fiscal year. The accomplishment is briefly summarized as follows:

States active.....	6
Large rivers affected.....	21
Counties engaged.....	42
Employment, average number.....	989
Units surveyed.....	492
Water samples analyzed.....	8, 877
Mine units sealed.....	128
Acid sealed, ton-year.....	156, 877
Acid reduced, ton-year (estimated).....	62, 750
Expended, wages.....	\$578, 599
Material, etc.....	\$74, 397

The total accomplishments to date include sealing 4,083 mine units with an estimated reduction of 626,774 tons of acid per year (determined as concentrated sulfuric acid) at a cost of \$7,382,179.

Further progress will depend upon the practical contributory support furnished by interested State agencies as sponsors. Uncompleted work under the plan thus far followed is estimated to be 7,300 man years.

PUBLIC HEALTH ENGINEERING ABSTRACTS

Public Health Engineering Abstracts are issued monthly, the change from the weekly mimeographed form having been made in January 1940. These abstracts are distributed only to those individuals engaged in public health engineering work who desire them, and to technical libraries. The abstracts are prepared by the various in-

dividuals on the mailing list. During the calendar year 1939, 1,192 abstracts, consisting of 468 mimeographed pages, were issued.

ANNUAL CONFERENCE OF THE SURGEON GENERAL WITH STATE AND TERRITORIAL HEALTH OFFICERS

In accordance with the act of Congress, July 1, 1902, the Thirty-eighth Annual Conference of State and Territorial Health Officers with the Public Health Service met on May 9, 1940. Representatives from 48 States, the District of Columbia, and the Territories of Alaska and Hawaii were present. This meeting was held in executive session.

Reports of the committees on qualifications and training of public health personnel, social security programs, venereal disease control, hospitals and medical care, interstate and foreign quarantine, and records and reports were presented to the Conference for consideration and approval. The program also included the following presentations: State training programs for public health, programs and budgets under title VI of the Social Security Act, programs and budgets under the Venereal Disease Control Act, Federal hospital building program, and plans for stream pollution control.

The following committees were appointed for the ensuing year: Committee on Social Security Programs, Dr. A. T. McCormack, chairman; Committee on Professional Education and Qualifications, Dr. J. N. Baker, chairman; Committee on Records and Reports, Dr. W. C. Williams, chairman; Committee on Venereal Disease Control, Dr. Robert H. Riley, chairman; Committee on Interstate and Foreign Quarantine, Dr. A. J. Chesley, chairman; Committee on Hospital and Medical Care, Dr. E. S. Godfrey, Jr., chairman.

NATIONAL INSTITUTE OF HEALTH

(DIVISION OF SCIENTIFIC RESEARCH)

Assistant Surgeon General L. R. THOMPSON, Director

The close of the fiscal year witnessed the completion of the group of laboratory buildings on the site near Bethesda, Md. With the exception of two structures still waiting for the installation of fixed equipment, these buildings have been occupied.

A brief description of the activities of the National Institute of Health follows.

DIVISION OF BIOLOGICS CONTROL

Senior Surgeon WALTER T. HARRISON in charge

Meningococci.—Considerable progress was made in standardizing the mouse protection test for evaluation of antimeningococcic serum. Owing to the variability of factors involved in the determination of the protective action of serum, a detailed study of each factor was undertaken.

Sixty samples of therapeutic polyvalent antimeningococcic serum were submitted by manufacturers for approval. Evaluation was made by means of the mouse protection method, by the plate precipitation method, and by agglutination at 56° C. and at 37° C. The results obtained in the first two methods were similar. Most of the serums protected mice against Group I meningococci as well as, or better than, the control serum. Few serums gave protection against Group II meningococci. Methods for improving Group II protective action are being investigated.

The comparative study of the protection afforded mice against meningococcus infection by sulfanilamide and by sulfapyridine, alone and in combination with serum, was completed. Sulfapyridine was found to be approximately 10 times as potent as sulfanilamide. A marked variation in the resistance of individual strains of meningococcus to both drug and serum was found. Some strains were more responsive to drugs than to serum; some were more responsive to serum than to drugs; all were more susceptible to the combination of serum and drug. Strains belonging to Group II were more variable than those belonging to Group I.

The study of the incidence of the serologic groups of meningococci from meningitis occurring in various parts of the country was continued. Of 31 strains received, 14 were of Group I and 17 of Group II. Eleven of the Group I strains came from 1 locality.

Hemophilus influenzae.—Owing to the relatively high proportion of *Hemophilus influenzae* infections among cases of meningitis in children, studies of this infection have been continued. Twenty-six

strains were received, the majority being from hospitals in Washington, D. C.

A study of the protective action of sulfapyridine in experimental infections of *Hemophilus influenzae* (non-type-specific) in mice showed that the drug was definitely influential in recovery.

In collaboration with the Division of Chemistry, determinations of the V factor (coenzymes I and II) in the urine and tissues of normal dogs and dogs with blacktongue, and in tissues of normal rats were made by use of *Hemophilus parainfluenzae*. The amount excreted in urine was fairly constant and was not influenced by diet either rich or deficient in nicotinic acid. The amount in certain tissues was correlated with intake of nicotinic acid.

Pneumococci.—Typing serums.—Much greater uniformity in potency and in absence of cross reactions has been observed since the adoption of uniform methods of testing typing serums in 1939. Samples and protocols of 382 monovalent typing serums and 72 typing serum mixtures were submitted by manufacturers for approval.

Considerable time has been given to the study of strains of pneumococci either related to or different from the present recognized types in order to determine if they should be given the status of a new type. Among the specimens of pathologic materials or cultures of strains received for typing or verification, nine cultures differed from recognized types, six of them being identical. Six other cultures differed from the recognized types but the variation was not sufficiently marked to classify them as new types.

Therapeutic serums.—Protocols and samples of 286 antipneumococcic horse and rabbit serums have been submitted by manufacturers for approval.

All horse serums and all rabbit serums for types I, II, V, VII, and VIII have been tested by the mouse-protection test in comparison with standard-control serums. Antipneumococcic rabbit serums of other types were approved on the basis of mouse-protection tests or determinations of the antibody nitrogen content.

Considerable progress has been made in determining the factors influencing the mouse-protection test. These studies have been continued in an effort to standardize the mouse-protection test and to evaluate correctly the potency of therapeutic serums of the types for which official control serums have not been established.

Rabies.—A test for standardizing the immunizing potency of anti-rabic vaccines has been developed. It consists of a series of intraperitoneal immunizing doses in mice, followed by homologous fixed virus given intracerebrally.

Various factors which influence the efficacy of phenolized rabies vaccines are being investigated. A study of 31 substrains of fixed virus showed that they may vary widely in their characteristics, including their ability to immunize mice, even though many substrains are from the same source. Immunizing ability has been found to be related to the rapidity of animal passage and the ability of the virus to resist the lethal effect of phenol. The immunizing potency of a phenolized vaccine also depends on the virulence of the virus which, in turn, is related to the amount inoculated and the time the animal is killed. The potency of the phenolized vaccine is determined by the lethal effect of the phenol which varies according to the denseness of

the brain emulsion, the amount of phenol, when the phenol is added, temperature of incubation, amount of agitation, diluent, and type of container. Studies are in progress on the relative effects of rapid and prolonged phenolization of the virus, on methods of increasing the immunizing ability of a fixed virus strain, and on storage factors determining the life of vaccines.

Gas gangrene.—Studies have been made of methods of preparation of perfringens toxoid. Different methods of concentrating and precipitating toxoids have been used, most of which have resulted in a product of insufficient antigenicity, when tested in guinea pigs, to justify experimental use in human beings. Good results, however, have been obtained by precipitating with ammonium sulfate, concentrating to a small volume, dialyzing and reprecipitating with 2 percent alum. Guinea pigs immunized with such toxoids have shown some immunity.

Standardization of botulinus antitoxin.—Work is in progress on the preparation of dried antitoxins, types A and B, to be used as official standards replacing glycerinated antitoxins which have been in use for several years. Dried toxins for the two types have been prepared.

Arsenical preparations.—Studies on the spirocheticidal activity of the arsphenamines in experimental syphilis in rabbits, with special reference to the efficiency of sulfarsphenamine, have been continued.

Recorded observations of the therapeutic efficiency of nearsphenamine indicated that the minimal effective dose in experimental syphilis may vary from test to test. Variations in effective dosage are probably due to variable factors in the experimental infection, to which the virulence of the organism may contribute.

Seventeen lots of nearsphenamine, representing seven domestic brands, have been reported as being uniformly active in curing experimental syphilis.

Continued studies of the effect of artificial temperatures upon nearsphenamine, with less than 1.5 percent moisture, indicated marked improvement in the stability of the commercial product.

A reexamination of the alleged tendency of sulfarsphenamine to cause severe clinical reactions has been undertaken.

Tetanus.—A study has been undertaken to determine the significance of the time interval between doses of alum-precipitated tetanus toxoid in establishing a satisfactory basal immunity in man as measured by antitoxin titrations and by the response of the individual to a subsequent stimulating dose of toxoid.

Studies on the sensitizing effect of alum-precipitated toxoid in laboratory animals have shown that the sensitizing effect of the precipitate is many times that of the fluid toxoid.

Other studies.—Sufficient purified protein derivative of the tubercle bacillus has been prepared to suffice for a standard for the United States, and tests have been initiated. Thirty grams of the same lot have been held in storage for delivery to the custodian of the international standards. Unsettled European conditions have temporarily prevented delivery of the international standard.

Studies on smallpox, diphtheria, and pertussis have been continued. It is expected that the smallpox and diphtheria studies will be completed during the next fiscal year.

Licensed establishments.—At the close of the fiscal year 69 establishments, 15 of which were foreign, held licenses to engage in the interstate sale of biologic products. The licenses covered 168 products.

DIVISION OF CHEMISTRY

Professor CLAUDE S. HUDSON in Charge

Sugar researches.—Fundamental studies relating to the structure and configuration of the carbohydrates were continued. They included further applications of the periodate oxidation method, with special reference to the cleavage of the carbon chain of levoglucosan, the ring structure of D-altrosan, the structures of β -methyl-D-ribosepyranoside, D-mannosan, β -dianisoyl dulcitol, dibenzylidene dulcitol, sucrose, and starch.

Pyrolysis of ivory nut meal was found to yield a hexose anhydride, D-mannosan, which was isolated as the acetone derivative. The D-mannosan has been converted to an anhydro-D-mannosan, the first example of this class of compounds. Levoglucosan has been converted to a monotosylated anhydro-D-glucosan, thus serving as a second example. In the study of the behavior of the latter with a certain rearranging mixture, results were obtained that appear to indicate an acetylation with an accompanying Walden inversion. This is of interest since such inversions resemble, and hence may explain, the changing of glucose to galactose in the mammary gland.

The study of D-altrose and its derivatives was continued, and results were obtained that form the basis of a more convenient method for their preparation. Experiments were carried out for determining the conditions favoring high yields of L-glucoheptulose by the biochemical oxidation of D-glucoheptitol. Studies on the oxidative degradation of L-glucoheptulose to L-gluconic acid resulted also in the formation of a considerable amount of L-arabonic acid, by the loss of two carbon atoms. This reaction may be useful in the preparation of D-ribonic acid, and subsequently D-ribose, direct from sedoheptulose. Studies were also carried out on the preparation of pure crystalline D-ribose from D-arabinose by the method of Steiger, and from nucleic acid by Phelps' method.

The systematic study of the preparation and properties of the higher sugars and their derivatives was continued. Large quantities of α,α - and α,β -gluco-octonic lactones have been prepared from α -glucoheptose; the methyl ester of α,α -gluco-octonic lactone was obtained in crystalline form; α,α -gluco-octonic amide and its octa-acetate were prepared and characterized for the first time; and mutarotation studies were carried out on D- α,α -gluco-octose monohydrate, which have indicated that it is a furanoside form. Studies were also conducted on 10 compounds of the α,β -manno-octose series.

In connection with structural studies on acetals of sugar alcohols, experimental proof was obtained of the structure of di-benzal dulcitol. Incidental to this work, it was shown that acetolysis of acetals by a certain rearranging mixture led to mixed acyl derivatives. It is believed that this reaction may have large applications in structural problems involving processes such as de-acetonization or de-benzalation

with simultaneous acetylation. Preliminary observations have been made on the structures of the α - and β -di-anisoyl dulcitol and on di-*o*-nitrobenzal dulcitol.

Work was continued on the systematic preparation of the sugar alcohols and their higher rotating acyl derivatives. Ten such compounds were prepared and their constants determined. Three of these compounds were not previously reported in the literature.

Other researches in this field included a continuation of the studies of the changes effected in crystalline penta-acetyl- α -methyl-D-manno-D-galaheptoside by recrystallization processes or by means of ultra-violet light, with special reference to the establishment of proof of differences between apparent isomers and the nature of these differences; a study of the structure of dibenzylidene dulcitol; a search of natural sources for certain rare sugars; development of a simplified method of assay for sedoheptulose; and improvements in the method for preparing levoglucosan.

Researches on starch.—The study of the structure of starch by application of periodate oxidations was continued. A method has been developed for measuring terminal groups in starches and dextrans which is much simpler than the method used heretofore. This method depends on the addition of ethylene glycol to the carbohydrate solution which has been completely oxidized by an excess of sodium metaperiodate. The ethylene glycol reduces the excess metaperiodate, thus permitting a determination of the produced formic acid by direct titration or after removal by steam distillation.

It was found possible to isolate D-erythronic acid in the form of its lactone directly from the preparation mixture. These studies have also led to the preparation of *meso* erythritol from starch. The actual separation of *meso* erythritol from the preparation mixture is considered to be quantitative. From the residual material has been isolated glycol aldehyde. The presence of this substance along with *meso* erythritol confirms the structure of the fundamental unit in starch as an α -glucopyranose unit held in the molecule through 1,4-linkages. The results are also of practical importance in that the preparation of D-erythronic acid and *meso* erythritol from starch provides, for the first time, convenient methods for obtaining them.

Studies were made of the action upon starch of the enzyme produced in cultures of *Aerobacillus macerans*. An improved procedure for separating and purifying the crystalline dextrans was developed. The pure compounds were found to rotate several degrees higher than had been previously reported by others.

Enzyme researches.—The study of the method for the purification of invertase by adsorption on bentonite was continued. It was found possible to simplify the procedure by eliminating the preliminary filtration of the precipitate formed during dialysis and by shortening considerably the time. In the purification of invertase by direct acid precipitation, the time the yeast is autolyzed, the dilution during dialysis, and the time the autolysates are dialyzed were found to be important factors.

Two new precipitants for invertase have been added to the series already under investigation, namely, flavianic and rhodanilic acids. Other precipitants studied were picric acid, picrolonic acid, Reinecke salt, uranyl acetate, and ammonium sulfate. Of these, picric acid has

given the best results. By means of one picric acid precipitation, products have been obtained equal in purity to the bentonite purified invertase solutions.

Chemico-bacteriological studies.—The study of the starch-digesting enzymes of *Aerobacillus macerans* and related bacterial species has been continued. The amylase of *A. polymyxa*, like that of *A. macerans*, was found to be capable of concentration and purification by acetone precipitation. That of *A. macerans* has been purified still further, obtaining preparations that digested about 500 times their weight of starch. The solutions could not be dialyzed free from phosphate without loss of activity, but if sterilized by filtration and kept cold there was no loss of activity for at least a year.

Methods have been developed for measuring quantitatively the amounts of enzyme produced under various conditions by *A. macerans* and *A. polymyxa* even for very small amounts of enzyme. These tests have been found to be useful also in identifying these and other closely related bacteria, and several questionable members of the *Aerobacillus* group have thus been identified with certainty.

Biochemical dental studies.—Determinations of total nitrogen, ammoniacal nitrogen, oxygen consumed, coagulation pH, total solids, and ash were carried out on about 370 samples of saliva, in connection with studies on dental caries. In experiments on rats, it was found that certain concentrations of fluoride or iodo-acetic acid in the drinking water inhibited induced caries.

Studies on fluorides in water.—The studies on fluorides in drinking water were continued. In cooperation with the Division of Infectious Diseases, 194 samples of drinking water were received from various localities in the United States for chemical analyses, including fluoride determinations, for the purpose of ascertaining possible correlations between the chemical composition of the drinking water, especially the fluoride concentrations, and the observed dental caries.

Analytical work.—There were carried out about 308 various analyses of miscellaneous material; 29 analyses of arsphenamines and neo-arsphenamines; 10 examinations of pharmaceuticals; 74 preparations of standard solutions; and 242 micro determinations in connection with the sugar researches.

NUTRITION INVESTIGATIONS

Studies on human riboflavin deficiency were continued at the Milledgeville, Ga., field station. The symptomatology of this deficiency was studied more closely and data were obtained on the excretion of riboflavin under varying conditions. Additional observations on the human requirement of nicotinic acid and riboflavin have been initiated.

In collaboration with the University of Georgia Medical School and the Milbank Memorial Fund, it was found that interstitial keratitis is one of the manifestations of riboflavin deficiency and that the use of riboflavin causes rapid improvement in cases of keratitis which were of unknown origin and in which treatment had been unsatisfactory.

It was found that a necrotic lesion of the adrenals in rats could be produced by a deficient diet. Attempts to identify the deficiency factor were in progress at the close of the fiscal year.

Assays of the riboflavin and coenzyme content of the urine and tissues of experimental animals were carried out. Experiments with a bacterial growth method for assaying nicotinic acid and its derivatives, and the study of the experimental pellagra-preventive value of various substances, were continued.

Supervision over the mineral analyses of Tennessee and Alabama foods was continued and these studies were extended in the new nutrition laboratory of the Tennessee Valley Authority. Nutrition activities in various State health departments were observed and advice on the programs was given to State health department nutritionists.

The study on the factors governing the vitamin C content of plants was continued.

A start was made toward organizing studies on the process of aging.

DIVISION OF INDUSTRIAL HYGIENE

Passed Assistant Surgeon P. A. NEAL in charge

The Division of Industrial Hygiene has as its objective the development of means for the protection and improvement of the health of the working population. Its activities include field investigations, laboratory research, and services to State and local health departments, industry, labor, and others.

In April 1940, Senior Surgeon R. R. Sayers who had been in charge of the Division since 1933 was made Acting Director of the Bureau of Mines; on June 18, 1940, he was made Director.

During the year, dermatoses investigations were transferred to the Division of Infectious Diseases of the National Institute of Health.

FIELD INVESTIGATIONS AND LABORATORY RESEARCH

Dust studies.—*Mica and pegmatite:* A report of a study of pneumoconiosis among mica and pegmatite workers appeared as Public Health Bulletin No. 250. Ten cases of pneumoconiosis were found on examination of 57 men exposed to mica dust. Twenty-three cases of silicosis were found on examination of 741 men exposed to pegmatite dusts. Equipment and practices are described in the report which have effectively reduced dust exposure to safe limits in similar operations in other industries.

Mines and smelters: A study was made in Utah in cooperation with the State Board of Health for the purpose of determining the occupational disease problems in the State. Approximately 3,000 metal miners, coal miners, and smelter workers were given a comprehensive medical examination. The study also included a detailed investigation of the working environment and community sanitation. The report on the findings is now in preparation.

Experimental pathologic studies utilizing the intraperitoneal method of determining whether a dust is capable of causing pneumoconiosis were made on the dusts encountered in the pegmatite and mica study. A report giving the physiological reactions produced by 80 industrial dusts in peritoneal tissue is in press. Similar tests were used on manganese and chromite dust and a report of a fatal case of manganese poisoning was made.

Motor transport study.—A report has been submitted to the Interstate Commerce Commission concerning this initial investigation of fatigue and hours of service of interstate truck drivers. It was found that the average functional efficiency of drivers who had driven more than 10 hours since sleep was inferior to those who had driven less than 10 hours, and both groups were inferior to those who were presumably rested, according to tests of 6 functions, namely, speed of tapping, reaction-coordination time, reaction time, manual steadiness, driving vigilance, and the ability to distinguish flicker. Men who had driven at all performed less efficiently, on the average, than those who had not driven, according to tests of the following 4 functions: aiming, body sway, resistance to glare, and speed of eye movement. No trends with hours of driving were found in the estimation of size of known objects, the differential white cell counts, the hemoglobin content of blood, the acidity or specific gravity of urine, visual acuity (Snellen), and the total base and potassium concentration of blood serum. A method of making a composite score from a battery of tests was devised for comparing the general psycho-physiological status or fatigue pattern of different individuals. No occupational disease was found associated with truck driving, although such findings as tremor, blood-shot eyes, leucocytosis, and defective vision were frequently observed.

Spray residue studies.—These studies were continued and a report is in process of preparation. No cases of lead or arsenic intoxication were found, on medical examination in 1938-39, of 1,231 men, women, and children living in an apple- and pear-growing district. A large proportion of all subjects ate unwashed apples with a lead arsenate residue load averaging about 20 times the amount found on apples shipped in interstate commerce.

Orchard activities, such as spraying, thinning, mixing, and picking entail occupational exposures to lead arsenate. Urinary lead, blood lead, and urinary arsenic values reached maximal values among orchardists in the summer and continued at about the same levels as long as full-time orchard work was in progress. These values declined subsequently until orchard work was resumed in the spring. There is evidence among retired orchardists that these continue to decline until within a few years they have reached the level of values for consumers. Among consumers, only urinary arsenic values followed a seasonal course, rising for a brief period in the autumn.

Eighteen orchardists were the only ones considered as having lead absorption, as defined by the Committee on Lead Poisoning of the American Public Health Association. No case had a combination of symptoms, signs, and clinical and chemical laboratory findings that warranted a diagnosis of lead intoxication, incipient plumbism, or early lead poisoning. Various laboratory researches supplementing the field investigation have continued.

Compressed-air illness.—One paper on the use and administration of helium-oxygen mixture for prevention and relief of tubal and sinus block is now in press; another dealing with prophylaxis of compressed-air illness by means of an oxygen inhalation apparatus developed in the field is ready for publication.

Heavy metals.—*Manganese.* The occurrence of chronic manganese poisoning among the 34 workers in a manganese ore-crushing mill was found to vary with the atmospheric manganese concentration and with

the length of employment. Eleven cases were found. The report on the study, which includes a description of these cases, the results of extensive clinical and laboratory investigation, and recommendations for medical and engineering control, appeared as Public Health Bulletin No. 247.

Lead: The report on the study of chronic plumbism among 766 men employed in 6 lead storage battery factories has been submitted for publication. Various laboratory researches supplementing the spray residue field investigations have continued. Four reports have been published, including Public Health Bulletin No. 253. The laboratory studies on human subjects, which are almost completed, deal with diurnal variation of urinary lead excretion; a study of certain urinary constituents following the ingestion of lead arsenate; a comparison of lead and arsenic ingestion and excretion in man; and lead and arsenic content of urine from 46 nonexposed persons. Other laboratory investigations have shown that lead arsenate in serum splits off part of its arsenic acid and forms an insoluble chlorarsenate, that its solubility in saliva and gastric juice is sufficient to account for its break-down in passing through the alimentary canal, and that differences exist in the toxicity of various lead compounds depending upon solubility and particle size. The temporary nature of the deposited lead in the softer tissues throws further light on the course of lead through the body, while the extent and localization of lead in bone tissue indicates the usefulness of this as an index of lead absorption. Further information has been gained with regard to massive doses of lead salts in animals, the effect of the arsenic radical upon lead absorption and the relative toxicity of the lead and arsenate portions of the lead arsenate molecule. The toxicity of lead chloride in rats as measured by the rate of growth was shown to be dependent upon the quantity and quality of protein in the ration.

Mercury: A Public Health Bulletin has been prepared for publication discussing the characteristic medical and laboratory findings, and the incidence of 59 cases of mercurialism observed in a field study of 534 felt hat makers. No cases were found at mercury exposures of less than 1 mg. Hg per 10 cubic meters of air; at higher atmospheric concentrations the incidence increased with both intensity and duration of exposure. Methods for the control and prevention of mercurialism are presented.

Organic compounds—Toxicity of ketones: A report on the acute responses of guinea pigs to the inhalation of certain ketones has been submitted for publication.

Methyl bromide: As the result of the study of the effect of methyl bromide fumigation on foodstuffs, it was shown that animals fed for periods up to 52 weeks on diets fumigated with 3 pounds of methyl bromide per 1,000 cubic feet were not adversely affected; that fresh fruits and vegetables, dried fruits, and whole grains absorbed but small quantities of gas during fumigation, and that milled grains and fatty or oily foods (cheese, nuts, nut meats) absorb a considerable amount of methyl bromide during fumigation.

Carbon monoxide: In dogs anesthetized with sodium amytal a study was made of variations of the spinal and intracranial pressure, the arterial and venous blood pressure, the heart and respiratory rate, the minute and respiratory volume, the body temperature, and also of

the changes of oxygen, carbon dioxide, and carbon monoxide content of the blood during exposure to concentrations of from 0.25 to 1.0 percent carbon monoxide in air. It was found that several phases of the poisoning may be distinguished which may overlap each other. Studies are being made regarding changes of physiological functions and speed of elimination of carbon monoxide from the blood of dogs poisoned with carbon monoxide. These studies are being made to establish a better understanding of the underlying causes of carbon monoxide poisoning, for the purpose of determining the best treatment for this condition.

Physical methods.—The study of the sensitive line detection of metals in biological fluids has continued. Qualitative spectrographic analysis for 16 elements was made of 960 samples of urine from workers in coal and metal mines and smelters. Solar radiation both in the antirachitic ultraviolet and in the visible regions has been continuously recorded in connection with a tuberculosis study. Reliable instruments for this purpose have been developed in the laboratory. The technical requirements for obtaining ultraviolet absorption spectra of microscopic objects have been investigated and the results submitted for publication. The absorption spectra of erythrocytes, *Trichophyton mentagrophytes*, and *E. coli* have been determined. The latter 2 show absorption spectra which correlate well with lethal and genetic action spectra. It was found that the absorption of bacteria at wave lengths below 2,400 Å increases rapidly. The efficiency of killing bacteria at wave lengths below 2,400 Å is below the efficiency of 2,650 Å. Commercial solvents of the saturated aromatic hydrocarbon type were analyzed for impurities by means of their ultraviolet absorption spectrum. Investigations of air-borne bacteria have been continued in connection with the ventilation of buildings. In a study of hereditary effects of ultraviolet radiation continued in cooperation with the Carnegie Institution of Washington it was found that the energy necessary to produce mutations at 2,280 Å and 2,650 Å is very small. In connection with the influence of ultraviolet radiation in genetic changes of bacteria, it has been found that it takes about 10,000 to 100,000 times as much incident energy at the long ultraviolet as it takes at the short ultraviolet to produce the equivalent killing effect. Studies conducted in cooperation with the Division of Infectious Diseases have shown that fungus spores may recover their viability after monochromatic ultraviolet irradiation; recovered spores show higher mutation rates than spores tested at once after radiation. Grain irradiation has shown that ultraviolet will delay the appearance of fungus infection and increased respiration. In cooperation with the Department of Agriculture the Division has under way a study of the effect of ultraviolet on plant viruses. The sensitivity of the eggs of *Enterobius vermicularis* to 6 wave lengths in the ultraviolet was determined, showing high sensitivity at 2,280 Å and a small maximum sensitivity at 2,805.

The activities of the Washington Biophysical Institute¹ included investigations on the photochemistry of sterols, the development of instruments and methods of measurement, and cooperative investiga-

¹ The Washington Biophysical Institute operates under a grant administered by a standing committee of the Physical Science Division of the National Research Council, jointly sponsored by the National Institute of Health and the National Bureau of Standards. The Division of Industrial Hygiene furnishes laboratory space and standard equipment, while the National Bureau of Standards provides instrument shop facilities and material supplies.

tions. Eight papers have appeared, and two papers and a book are in press.

Physiological aspects of aviation.—Increasing commercial and military importance of aviation has focused attention upon certain problems arising from exposure of pilots and passengers to high altitudes and rapid change of altitude. Among these problems are the determination of critical levels of altitude (i. e., pressure) requiring the administration of oxygen and the design and function of efficient apparatus for supplying the needed extra oxygen. Work on the practical aspects of these problems is in progress, with the primary objective of improving existing methods of oxygen administration.

Studies of sickness among industrial workers.—*Incidence of disabling sickness:* The analysis of monthly reports from a group of industrial sick-benefit organizations providing sickness insurance for about 170,000 male employees was continued during the year and the results published quarterly. A study was published covering 18 years showing, among other things, that diseases of the circulatory system, including diseases of the heart, appendicitis, and nonindustrial injuries followed an upward trend. The first paper of a series on the duration of sickness and one investigating the morbidity and mortality from cancer among oil refinery workers are in press.

Occupational morbidity and mortality study: A report on disabling sickness among workers in the soap industry has appeared. The frequency rates varied from a minimum for office workers to a maximum for soap handlers and process laborers. Two published reports deal with the sickness experience of workers in the slaughter and meat-packing industry. Among other things, it was found that as the occupations of Negro and white males become more nearly alike, the magnitude of the excess in the frequency of disabilities among Negroes tends to decrease. A report on sickness among workers in mail-order stores has appeared. A published paper describing the essential features of a satisfactory occupation code, and the characteristics of the principal codes available carries suggestions for the construction of a code. Other papers of this series are in preparation.

Proposed plan for the recording of industrial absenteeism: As a result of the increasing interest of industry in the recording of sick absenteeism, a plan was proposed and made known to industry and others.

Compensation for industrial injuries: A report on the procedures followed in connection with the administration of blanket coverage of occupational diseases was submitted to the International Labour Office at their request.

CONSULTATION SERVICES

The Division has continued consultation services and aid to State and local health departments engaged in industrial hygiene activities. There are now 40 industrial hygiene units in State and local health departments, distributed among 29 States, 2 Territories, and 9 cities. Approximately 150 persons are engaged in these units, and of this number 115 are highly trained in industrial hygiene practice. The total funds expended by these units during the past year was approximately \$600,000. Although the development of a majority of the units was stimulated by title VI of the Social Security Act, it should

be recorded that the States of Connecticut, Idaho, Maryland, Minnesota, Mississippi, Montana, Rhode Island, and Utah have enacted special legislation now in force, which places all industrial hygiene activities directly in the health departments of these States. In several of these States the laws specifically recommend cooperation with other State agencies, such as labor departments and industrial commissions, in the preparation of rules and regulations for the control of health hazards in industry, in the enforcement of such rules and regulations, and in the adjudication of compensation claims.

Consultation services on administrative and technical subjects were given during the past year to all of the States. Considerable assistance has been given to the various States engaged in evaluating and controlling health hazards in industry. A comprehensive study was conducted in cooperation with the Utah State Board of Health at the request of the Utah Legislature, which appropriated a sum of \$25,000 to the State Board of Health for the purpose of determining the occupational disease problems in the State.

The entire resources and facilities of the Division have been at the disposal of the State units; among the various services may be listed analyses of industrial dusts, determinations of minute amounts of metals in body fluids, advice on statistical problems, the collection and analysis of morbidity reports, development and interpretation of chest X-ray films, examination of pathologic specimens, and training of personnel. During the Utah study many of the personnel from industrial hygiene units in neighboring States participated in the study, thereby gaining practical experience in industrial hygiene. Ten physicians and 7 engineers were trained at the Division laboratories. The Division personnel continued to lecture on industrial hygiene subjects at various universities, associations, and Federal agencies. Services were also rendered in the preparation of codes to be used as guides for the safe and healthful conduct of various industrial operations.

This Division acted as host for the third time to the National Conference of Governmental Industrial Hygienists, at which approximately 80 persons were present. The registrants represented 23 States, 6 cities, 1 county, 3 universities, and 3 Federal agencies. In addition to the various committee reports presented and discussed at the conference, a symposium was held on interdepartmental relationships, at which the programs of an industrial commission, a health department, the American Medical Association, and industry were presented.

Advances may be recorded this year among the States in the control of many health hazards and in bringing additional public health services to the working population by integrating the industrial hygiene program with other basic adult health services. The outstanding needs in industrial hygiene are more adequate funds and trained personnel. This is especially true at this time, in view of the added burdens which will be placed on industrial hygiene workers throughout the country in connection with the national defense program. This Division has prepared and submitted a plan of industrial hygiene services for the conservation of manpower in industry and in those other activities related to national defense. This plan envisages the utilization of the trained personnel of this Division working in the field in cooperation with the various State and local units in controlling existing health hazards.

DIVISION OF INFECTIOUS DISEASES

Senior Surgeon R. E. DYER in charge

RICKETTSIAL DISEASES

Laboratory and field investigations of the rickettsioses in the eastern, southern, and western States were continued during the year at the National Institute of Health, at the temporary field laboratory in Albany, Ga., and at the Rocky Mountain Laboratory, Hamilton, Mont. The two rickettsioses endemic in this country are typhus fever and Rocky Mountain spotted fever. A third member of this group is American "Q" fever (heretofore referred to as "nine-mile" fever). It is known to be present in the United States, but little is known about the extent of this infection at present.

Cultivation of rickettsiae.—Studies have been made of the methods most effective in the production of large numbers of rickettsiae of Rocky Mountain spotted fever, endemic typhus, and "Q" fever. Cultivation in the yolk sac of the chick embryo, followed by the inoculation of the infected yolk sac suspensions into mice by the intraperitoneal or the intranasal route, has produced good yields of rickettsiae.

The yolk sac of the developing chick embryo has been found superior to other embryonic chick tissues for the cultivation of rickettsiae and appears to provide an excellent source material for the preparation of highly refined rickettsial vaccines. From this medium, vaccines that satisfactorily protect laboratory animals have been prepared for Rocky Mountain spotted fever, epidemic typhus, boutonneuse fever, and American "Q" fever.

Yolk-sac Rocky Mountain spotted fever vaccine has been used experimentally in man. The results suggest its safety for human administration, and it is likely that it will soon replace the tick-tissue product now employed. Forty liters of the typhus vaccine have been forwarded to Hungary and Rumania for test use in refugee populations.

Rocky Mountain spotted fever.—No States were added to the list of 41 which reported cases of Rocky Mountain spotted fever in 1939, although the infection was found in new sections of certain States. The number of cases reported was approximately that of the previous year with only 1 State, Maryland, showing a definite increase.

The amount of tick-tissue vaccine manufactured during the year was 559 liters; 515 liters were distributed, 40 more than in 1939. About 160 liters have been used among the personnel of Federal field services, including 121 liters for the Civilian Conservation Corps.

Strains of the virus were isolated from patients and from ticks in the East during the year. In the main, these strains corresponded in virulence with strains previously found. However, some of the strains isolated and studied this past year were found to be as virulent for laboratory animals as the strains found in the northwestern States.

Attempts to find a chemotherapeutic agent for treatment of this disease ended in failure. A hyper-immune rabbit serum, which has given excellent results in the treatment of infected animals, was developed.

Typhus fever.—Little apparent increase in the geographical distribution of typhus was noted during the past year and the number of cases reported in the entire country remained approximately the same as for the previous year.

Attempts to develop an improved method of laboratory diagnosis were initiated and these studies are being continued. Studies were also made of methods of controlling the rat population in the typhus areas.

"Q" fever.—A study has been made of the immunological relationships between the Australian "Q" fever and the similar disease originating from a filter-passing agent isolated from ticks collected in Montana. It has been shown by simple agglutination and agglutinin absorption tests and by tests with filtrates of infected organs of laboratory animals that the two organisms are identical.

Miscellaneous studies at the Rocky Mountain Laboratory.—Further collections of *Ornithodoros hermsi* in new parts of the relapsing fever endemic area west of Denver, Colo., have provided additional evidence that this tick is the local vector. New collections have extended the range of *parkeri* to include Oregon, Nevada, parts of California, and new sections of Utah. Data from field studies have also extended the known distribution of *O. talaje* to new localities in California, Arizona, and Nevada.

The natural habitat of *O. coprophilus* has been found to be caves and old mine tunnels occupied by bats. Two new United States species of *Ornithodoros* have been described and three other new ones collected.

Studies of tick paralysis, of the new rickettsial infection isolated in 1937 from *Amblyomma maculatum*, of the interrelationships of rickettsial infections, and of the parasite fauna of animal burrows and nests have been continued without significant findings. A study of the Siphonaptera of native North American rabbits has been completed. The index to the literature of North American Siphonaptera being prepared in cooperation with the San Francisco Plague Laboratory is nearly completed. Work has been continued upon a monograph on the North American species of the tick genus *Ixodes* and upon a catalogue of nearctic Tabanidae. Nearly 20,000 ticks, fleas, and other parasites have been identified in connection with the field work of this laboratory or at the request of scientists and institutions in the United States and foreign countries.

VIRUS DISEASES

Poliomyelitis.—A strain of virus isolated from a fatal case of bulbar poliomyelitis was successfully transmitted to the Eastern cotton rat, in which it has now been carried for 51 generations. From cotton rats the virus was transmitted successfully to white mice. A satisfactory protection test to determine the presence or absence of antibodies in serum has been worked out, employing cotton rats or white mice. The test has been applied to 83 serums, mainly from South Carolina and Michigan, and the results have been published. Additional serums are being collected and studied.

Measures designed to alter the susceptibility of mice to neurotrophic viruses have been tried with certain suggestive results.

Lymphocytic choriomeningitis.—Reports of earlier investigations showing that house mice are an effective reservoir of lymphocytic choriomeningitis from which man is infected, have been confirmed by further studies conducted this year. The experimental infection in animals and the neutralization test on human serums indicate that a systemic type of the disease, without involvement of the central nerv-

ous system, exists. The first spontaneously occurring case of this type to be recognized clinically occurred at the National Institute of Health. It resembled influenza, but the virus of choriomeningitis was isolated from the patient's blood.

As a diagnostic aid to physicians, serums of 78 persons were tested for antibodies capable of neutralizing the virus of choriomeningitis.

Encephalitis (St. Louis type).—Unsuccessful attempts were made to establish in mice a strain of the virus which could be communicated from injected animals to contacts and offspring, in a manner similar to that by which choriomeningitis is spread among these rodents.

Influenza.—The histopathology of experimental influenza in ferrets was studied and reported. Immune rabbit serums against human influenza were prepared and studied for prophylactic and therapeutic effects in experimental influenza in mice. Some protective action was found, confirming reports of other workers. About 350 chemical compounds were studied for therapeutic action against experimental influenza in mice. This work is still in progress. The effect of prolonged ingestion of varying amounts of alcohol upon experimental influenza in mice is under study.

Lymphopathia venereum.—It was found that this virus can be adapted to the lungs of mice, producing a rapidly fatal pneumonia, the histopathology of which is being studied. Certain chemical compounds have been shown to exert a definite protective action against this type of infection in mice. Other compounds are now being tested for therapeutic effect. Oral administration of the sodium salt of sulfanilic acid has been used instead of intravenous therapy in the treatment of 51 patients with lymphopathia venereum. Results have indicated that the former route is not so effective as the latter.

PNEUMONIA

The program of pneumonia studies has continued along the lines previously indicated: (1) Isolation of pneumococcus antibody from immune rabbit plasma; (2) chemotherapy against the pneumococcus; and (3) the isolation of the best possible antigen of the pneumococcus for evaluation of active immunity against pneumonia in human beings. This latter project has claimed the major attention this year.

Pneumococcus antibody.—Four salting-out methods, successful in immune horse serum, have been applied to antipneumococcus rabbit plasma which will separate the antibody from 95 percent of the inert material in this plasma, namely, sodium chloride, calcium phosphate formed *in situ*, sodium sulfate, and ethyl alcohol. However, all methods so far used also precipitate a substance which apparently exhibits the toxicity of the serum of one animal species for another, i. e., primary toxicity. This has been largely if not entirely eliminated by precipitating the fraction insoluble in the acid pH range, 4.8 to 5.2. Insufficient tests have been made in human beings to indicate the best product obtainable from immune plasma, but enough have been made to show that elimination of the acid fraction, as was found with antipneumococcus horse serum, makes a suitable antibody preparation for human therapy.

Chemotherapy.—A large number of compounds have been synthesized and studied against the pneumococcus. The emphasis has been on heterocyclic compounds condensed with sulfanilamide and other

groups which have been shown to possess a certain amount of activity against these infectious agents. Results have been promising, and have provided leads for the development of more active compounds. Comparisons were made at all times with sulfanilamide, sulfapyridine, and sulfathiazole as controls.

It has been found that sulfapyridine, sulfathiazole, sulfanilamide, and the sodium salt of sulfanilic acid are active against the virus of lymphopathia venereum, but that the last mentioned compound is one-tenth as toxic and can be tolerated better in a dose sufficient to produce almost as high antiviricidal action in mice as the three other compounds.

Polysaccharide antigen.—Polysaccharide antigens have been prepared for the 31 recognized types of pneumococci. These preparations will be used for skin test and antigenicity studies in human beings.

A study on the antigenic polysaccharide of the pneumococcus has revealed that 5 percent of more than 1,000 individuals failed to respond to type I antigen and 1 percent failed to respond to type II, as indicated by the absence of serum antibodies. The remaining individuals, some 94 percent of the group, showed marked differences in degree of response. Some were protected by 0.1 cc. of serum against 1 lethal dose of pneumococci and others were protected against 1,000,000 lethal doses. The same differences in individual response were observed in an experiment in which whole-cell vaccine was used.

Skin tests have been used in attempts to divide a sample of the general population (5,000 in number) into good reactors and poor reactors to the immunizing antigen, in order to determine whether or not the incidence of pneumonia differs in these two groups. Although insufficient time has elapsed to draw conclusions, no pneumonia has occurred thus far in either group. Efforts have been made to improve the antigen or the method of injection so that poor responders may be stimulated to produce serum antibody. So far, however, all preparations of antigenic polysaccharide and of whole-cell vaccine have been only partially successful in the dosage and methods of administration employed.

HEART DISEASE

Heart disease investigations were pursued under two categories: (1) Clinical and laboratory studies in Washington, D. C., and (2) epidemiological studies in Philadelphia, Pa.

Clinical and laboratory studies.—The clinical study of patients with rheumatic fever was continued. An attempt was made to induce the disease in animals by the transfer of materials obtained from patients and at autopsy. Advantage was taken of recently reported techniques for inducing cardiac lesions during the course of bacterial and virus infections which commonly spare the heart. These included the simultaneous administration of acacia or induction of anaphylactic shock. Investigations to date have afforded no proof of the presence of a virus in the etiology of rheumatic fever.

In continuing the study of a possible relationship between rheumatic fever and exophthalmic goiter, animals infected with hemolytic streptococci were rendered hyperthyroid. Neither the infection nor the glandular dysfunction alone was found to be responsible for morphologic cardiac damage; when they were combined, extensive

cardiac lesions developed which bore a slight resemblance to those found in rheumatic heart disease.

Other studies and results have included: (a) Demonstration of the improbability that, as has been suggested in scientific reports, pleuropneumonia-like, filter-passing organisms are implicated in the etiology of rheumatic fever; (b) further observation of the formol-gel reaction in patients with rheumatic fever; (c) demonstration of the fallibility of a complement-fixation reaction, recently described in scientific literature, in the diagnosis of rheumatic fever.

Epidemiological studies.—Studies of heart-disease mortality among persons 5 to 24 years of age indicated a reduction of 27.6 percent in the United States registration area during 1930–36 as compared with 1922–29. Since most of these deaths are due to rheumatic heart disease, these data may be interpreted as indicating a reduction in mortality from that cause. Although the reduction was general throughout the United States, it was greatest in the New England, Middle Atlantic, East North Central, and Pacific Coast States, regions in which great emphasis has been placed on the early diagnosis and prolonged treatment of rheumatic fever.

The study also disclosed that death rates from heart disease among persons 5 to 24 years of age are greatest along the upper Atlantic seaboard, in Michigan and Illinois, and in the Mountain States of Utah, Wyoming, and Colorado. The death rate per 100,000 was consistently highest in Utah. This finding is not in accord with many widely accepted hypotheses concerning rheumatic infection, since Utah has a high altitude, a low rainfall, and is not among the coldest States. On the other hand, rejections for the draft in 1918, early studies of the Public Health Service, and clinical studies in Utah suggest a high incidence of rheumatic heart disease.

Mortality from heart disease among persons 5 to 24 years of age was higher among Negroes than among white persons in every State and nearly every city in which mortality statistics are computed according to color. The death rate from heart disease in this age period among white persons in the deep South was approximately one-third of that among the corresponding groups along the Atlantic seaboard north of Virginia. These data suggest that although rheumatic heart disease is distinctly less common in the deep South, it should not be regarded as a rarity.

A study of rheumatic heart disease in Philadelphia hospitals during 1930–34 was completed. The peak age-incidence at onset and on admission to the hospital for rheumatic heart disease was in the 5- to 9-year age period, despite the fact that general hospitals as well as children's hospitals were included. The mean age at death was approximately 30 years. The average interval between onset and death among patients who succumb to rheumatic heart disease was about 15 years. Each year there were over 1,200 admissions to Philadelphia hospitals for rheumatic fever, Sydenham's chorea, rheumatic heart disease, and subacute bacterial endocarditis; of these, over 200 terminated fatally.

A composite study of 3,856 cases of organic heart disease in 19 Philadelphia heart clinics indicated that 41.1 percent was of the rheumatic type, 5.1 percent was due to congenital malformations, 5.1 percent to syphilis of the heart and aorta, 23.6 percent to arterio-

sclerotic heart disease, 14.7 percent to hypertensive heart disease, and the remainder was due to other and unknown causes. Syphilis of the heart and aorta was found to be especially prevalent among adult colored males. It was relatively infrequent among adult white females.

MALARIA

Research was continued in the field stations at Savannah, Ga.; Columbia, S. C.; Memphis, Tenn.; Ancon, C. Z.; and Washington, D. C.

Parasitology and immunology.—The strain of *P. malariae* established by the National Institute of Health now shows a high synchronicity and a marked periodicity of 72 hours. The time of sporulation and paroxysms has been regulated by modifying the activity of the patient. A reported strain of gametocyte-free malaria has been found to produce typical gametocytes in normal numbers. *P. vivax* has been shown to give a positive reaction in the standard serologic test for syphilis. The technique of sporozoite suspension cultures has been improved by freezing at approximately 32° F. By modifying the staining technique, immature gametocytes and developing asexual forms have been differentiated both in avian and in human malaria. Unsuccessful efforts have been made to discover the transmitting agent of *P. relictum* of the pigeon. One specimen of *A. walkeri* was found naturally infected with a species of plasmodium which was indistinguishable from human malaria strains as observed in laboratory infected *A. quadrimaculatus*.

Seven State laboratories were checked for accuracy of malaria diagnoses and instruction classes in thick film technique were held in 5 of these, approximately 100 technicians attending. Twenty-four hundred blood films were examined for malaria. Studies in serologic reactions in malaria have been continued. A new and highly efficient blood stain for malaria parasites has been developed using only American made dyes. A rapid technique for staining thick film malaria slides has also been originated.

Anopheline biology.—*A. darlingi* Root, a dangerous malaria carrier, has been discovered in British Honduras. General ecological studies of anophelines have been continued. Ponds near the Savannah laboratory have been classified according to desmid content. A study of pond ecology as related to anopheline production has been started.

Malaria therapy.—Studies on the malaria therapy of paresis have been continued. The second season's study of malaria prophylaxis by means of atabrine has been concluded and the third season started. The study will continue through the next period of rising malaria rates.

Control of anopheles.—Studies have been continued of suitable linings for malaria control ditches and of ditch-bank stabilization by sodding and seeding. A monograph on the *Anopheles* of the Caribbean area has been nearly completed, but publication has been delayed owing to the discovery of new materials.

The pandemic of malaria transmitted by *Anopheles gambiae*, which resulted from the importation of the African vector into northeast Brazil, was investigated in cooperation with the doctors of the International Health Division of the Rockefeller Foundation and Brazilian government authorities.

Three officers were detailed to assist the Chinese Government in organizing effective malaria control in Yunnan Province, China, along the China-Burma highway.

Educational.—Statistical studies on the prevalence of malaria have been continued. Lectures on malaria for teaching purposes have been revised; and photomicrographic lantern slides of malaria parasites have been made in color. Educational activities have been continued in the form of lectures and demonstrations to civic groups and to medical and technical schools.

TUBERCULOSIS

Epidemiological studies of the extent and causes of the high tuberculosis incidence and mortality in middle Tennessee and Kentucky as compared with the southern Coastal Plain were continued along the lines previously reported.

Laboratory studies are under way pertaining to the possible relationship between strains of tubercle bacilli and certain observed variations in epidemiology and mortality from tuberculosis in the southeastern United States. This has involved studies of type strains of tubercle bacilli isolated in that area, during which examples of dissociation of strains have been encountered. The purpose of studying this phenomenon is to determine its relation, if any, to the observed variation in tuberculosis.

A systematic study to elicit the etiology of pulmonary lesions encountered in epidemiological observations in the southeastern United States has been initiated.

In the studies on the possible role of silica in tuberculosis, a more satisfactory method for evaluating the rate and extent of the growth of the tubercle bacillus *in vitro* has been developed. The procedure is based on an improved technique for measuring the respiratory requirements of the organism. Numerous micro-analyses have been made to determine the silica content of tubercle bacilli grown on Long's medium. It is doubtful, however, whether definite conclusions regarding the influence of silica on the growth of the tubercle bacillus *in vitro* can be drawn from existing data.

DENTAL STUDIES

The study of the relation of the mineral composition of domestic water supplies to dental caries in communities having different dental caries experience has been considerably expanded, and some interesting findings have been observed.

A study of the quantitative relation between minute amounts of fluoride in the drinking water and the amount of dental caries in the community has been completed. About 6,500 school children, aged 12 to 14 years, were examined in 18 cities in 4 States. The fluoride (F) content of the water supplies ranged from 0 to 2.5 parts per million, the total permanent hardness from 20 to 350 parts per million. The amount of dental caries in the cities whose public water supplies are practically free of fluorides was approximately 3 times that of the cities whose water supplies contained small amounts of fluorides (slightly over 1.0 part per million). Of those examined, 2,832 were children in 8 Chicago suburban communities. In collaboration with

Consultant Philip Jay of the University of Michigan School of Dentistry, quantitative estimations of the number of oral *L. acidophilus* in the saliva were made of 1,761 of this group. Monthly water samples were received from each of the 18 cities and complete mineral analyses were made by the Division of Chemistry.

Two studies, planned to elucidate information on the manner in which this inhibitory mechanism operates, were completed during the year. They involved studies of: (a) A population exposed to water of high fluoride concentration during the period of tooth calcification followed by exposure during the post-eruptive period to waters practically free of fluorides; and (b) a population whose teeth calcified while using waters practically free of fluorides followed during the post-eruptive period by exposure to high fluoride waters. Approximately 1,200 children were included in these two studies.

Saliva studies resulted in the application of a formol titration method for saliva ammonia, and in the discovery of some interesting variations in the iso-electric zone of different salivas. Studies were also made of the fluorine content of salivas. Collaborative studies with the Section of Nutrition, Division of Chemistry, showed that induced caries in the molars of rats was markedly inhibited by sodium fluoride added either to the food or the drinking water. This effect of fluoride is probably antienzymatic. Iodoacetic acid also inhibits rat caries; free iodine and potassium iodide in the drinking water do not inhibit rat caries. Sulfate may lessen the effects of fluoride waters.

A 1 year study of 127 Arlington County, Va., seventh grade white school children was completed. This study included 2 clinical examinations of the teeth of each child, 5 separate bacteriological examinations, and 3 chemical analyses of the saliva of each individual. The clinical examinations showed that during the 1 year period of observation the dental caries experience increased approximately 2 permanent teeth per child. Correlation between dental caries activity and the number of *L. acidophilus* in the saliva was found. No significant correlation was found between the chemical findings (saliva) and dental caries activity.

CHEMOTHERAPY

Drug addiction.—Studies on the action of new morphine derivatives under prolonged administration to addicted and nonaddicted patients were conducted in cooperation with the Massachusetts Department of Public Health, the National Research Council, and the United States Public Health Service Hospital at Lexington, Ky. These investigations are reported by the Division of Mental Hygiene (p. 153).

Antimalarial drugs.—Control of malaria, except for measures directed against the mosquito, rests chiefly upon the use of quinine and two synthetic drugs. None of these is satisfactory for prophylaxis or for the prevention of relapses. It is particularly important that the United States be independent of quinine, which is entirely of foreign origin. With the cooperation of the Committee on Chemotherapy of the National Research Council, researches are being conducted on the synthesis of new drugs especially directed toward prevention of malaria as well as its cure.

MEDICAL MYCOLOGY

Besides material obtained for special research studies, 204 miscellaneous specimens (cultures of fungi, and squames, sputum, etc.) were received. This limited diagnostic service has brought in the following material of more than usual interest: A pathogenic species of *Sporotrichum* isolated from sphagnum from which several florists were infected; fungi isolated from 3 cases of subacute bacterial endocarditis in drug addicts, identified as species of *Candida* (Monilia) and found to be a new etiologic agent for this condition; several rare or unusual pathogenic fungi identified in culture or isolated from infectious material.

Chromoblastomycosis.—The sixth case of chromoblastomycosis in continental United States was reported in cooperation with Doctors Howard and Hugh Hailey of Atlanta.

Ultraviolet.—In cooperation with the Division of Industrial Hygiene, the effects of radiation with monochromatic ultraviolet on spores of dermatophytes have been studied and the efficiency of wavelengths 2537 and 2650 Å in killing fungi and in inducing mutations was reported.

Dandruff.—A simple method for isolating *Pityrosporum ovale* was devised and reported. This organism, the culture of which has usually been considered difficult or impossible, is associated with dandruff, but probably, as indicated in this study, not in an etiologic relationship.

Pulmonary disease.—A large number of sputum specimens from individuals with pulmonary disease have been examined in connection with studies of tuberculosis in the South. So far proof has not been obtained that fungi are important causes of pulmonary disease in this area, but field and laboratory studies bearing on this point are being continued. Attempts are being made to develop serologic methods of attacking this problem.

LEPROSY

In Continental United States.—A survey of the leprosy problem in the United States has led to the opinion that the disease has been present for at least 150 years, probably much longer, and that at the present time it is neither materially increasing nor declining. If the concept is adopted that leprosy in a country runs an epidemic course similar to other epidemic diseases, but covering generations and centuries rather than time measured by weeks and months, it may be concluded that leprosy in the United States is now in the plateau phase of an epidemic curve.

Why leprosy found conditions favorable to spread in the Gulf Coast States only, while elsewhere in the country it has tended to self-extinction, remains one of the most baffling, and the most important, of problems presented by the disease. Standing between these extremes are the areas (of which Minnesota and California are typical) where the infection dies out in one generation of the native-born. Even more puzzling is the small number of cases (possibly five) developing far from an endemic focus and without known source of infection.

Leprosy has come to the United States from all countries of the world in which the disease prevails but there is no indication that the

strains from various foreign areas differed in any way from one another.

There is an interesting intensive localization of leprosy in the extreme southern part of Florida and in the extreme southern part of Texas. In each case it is doubtless related to proximity to foci of infection in neighboring Latin-American countries. Many of these cases occur in persons born in the United States.

Much consideration has been given to the efficiency, or want of efficiency, of attempts to control the disease by isolation. Obviously, if the disease does not spread in an area, isolation is not necessary from the public health point of view. In areas of endemic prevalence, cases are not usually brought to the attention of the health officer until the disease has existed in the individual for some years and many persons already have been exposed. The conclusion is inevitable that no area is available from which adequate data may be obtained for an appraisal of the value of control measures.

In Hawaii.—The activities of the leprosy investigation station consisted of studies of the different problems of leprosy and the care and treatment of patients in the adjoining territorial receiving hospital.

Attempts were made to grow *Mycobacterium leprae murium* on 130 different media made from extracts of tissues with the addition of various supposedly growth-promoting substances.

Efforts to infect rats and mice with human leprosy were continued, using various methods to lower the resistance of the experimental hosts. Results to date have been negative. The effects of many chemicals on the course of rat leprosy were studied.

A great many more biopsies were made than in the past because accurate clinical diagnoses of the different types of leprosy require studies of the pathology of the skin lesions. Furthermore, *Mycobacterium leprae* was found in biopsy sections in some cases that failed to reveal the organism by the snip method. Biopsies are now being taken of cases before they are presented for temporary release. From a study of biopsy material it was found that nearly one-half of the leprosy patients at this institution had organisms invading the endothelial cells of the smaller blood vessels of the lesions. A comparative study was made of 3 of the diagnostic tests for syphilis in 100 patients with leprosy and the results have been made the subject of a detailed report.

It is over 2 years since thiamin chloride was first used at this institution for the treatment of the painful neuritis so commonly encountered among patients with leprosy. The drug was administered to approximately 20 patients with neuritis this past year and gave alleviation of pain within 24 to 48 hours in nearly every instance.

OTHER INVESTIGATIONS

Dermatoses.—The work of the Office of Dermatoses Investigations has doubled over that of the previous year. The section is now consulted not only by physicians but also by manufacturers concerning problems of contact dermatitis. Six outbreaks of industrial dermatoses were investigated, the causes found, and methods of prevention recommended. Outstanding among these was the discovery

that an antioxidant, monobenzyl ether of hydroquinone, used in rubber gloves caused leukoderma. This is the first time that a chemical cause of leukoderma has been discovered.

Clothing for the protection of workers from industrial skin irritants was devised. The materials used were pliofilm, koroseal, and vinylite. In the dermatoses clinic for governmental employees conducted by this office, 263 new cases were treated and 412 return treatments were given.

Enteric infections.—During the year field studies of the acute diarrheal diseases have been conducted in Dougherty County, Ga., and in New York City. Studies in Puerto Rico were also initiated. Comparable measures of case incidence and carrier prevalence are being obtained. Further evidence concerning the importance of *Shigella dysenteriae* infections has been revealed. Immunological observations necessary for epidemiological interpretation and the development of preventive measures are under way, and the analysis of data collected during the 4-year period of study is progressing.

Pertussis.—A new synthetic liquid medium for the growth of phase I, *H. pertussis* has been developed. This medium makes possible a reduction in the cost of whooping cough vaccine and reduces the amount of foreign protein in the vaccine to a negligible quantity. It also points the way to further improvement in pertussis antigens. Work is being continued on a promising method of testing for susceptibility to pertussis. Tests of a new vaccine are being continued.

Trachoma.—The question of the rickettsial nature of trachoma was investigated and the conclusion was reached that trachoma is not a rickettsial disease. Serums from 100 cases of trachoma were tested for the Weil-Felix reaction with essentially negative results. Negative results were also obtained in agglutination tests with 3 rickettsiae, those of endemic typhus and Australian "Q" fever and American "Q" fever. The inclusion body of trachoma, with its more complicated "developmental cycle," constitutes a mark of differentiation between the bodies of trachoma and the rickettsiae of typhus, Rocky Mountain spotted fever, and "Q" fever.

Diphtheria.—Work has been directed towards isolating chemical fractions of the diphtheria bacillus. Polysaccharides have been prepared by several methods from a number of strains of each of the three types. These fractions do not appear to be particularly active immunologically. In cooperation with the Division of Public Health Methods, a number of human serums have been titrated for their antitoxin content.

Hemolytic streptococci.—Studies were continued on the classification of beta hemolytic streptococci. Especial attention was given to a certain group of strains characterized by limited ability to ferment lactose. The group includes four of Griffith's serological types. Immune rabbit serums prepared with certain of these strains were found to protect mice against experimental infection with other strains of the group, regardless of the serological type.

Studies on the adsorption of three bacteriophages by living and killed streptococci and on the inhibition of activity of bacteriophage by various chemical fractions of the homologous streptococci were

completed. The A and C phages were readily adsorbed by all the Lancefield group A and C strains tested; but, while all the Group C strains adsorbed B phage, many of the Group A strains failed to do so. Living and heat-killed suspensions adsorbed equally well, but formalin-killed suspensions adsorbed less readily. None of the carbohydrate preparations was found to inhibit lysis by the phages, but mixture with some of the crude protein fractions caused a definite reduction in the number of plaques. However, a protein fraction obtained from a strain made resistant to lysis by rapid transfer in phage suspensions caused as marked inhibition as the same fraction from a strain of the same organism which was lysed completely.

Hemolytic streptococcus diseases.—The study of scarlet fever morbidity was continued in the two counties in which extensive active immunization has been carried out over several years. A purified and tannic acid precipitated toxin has been used as the antigen. The study has included approximately 48,000 child-years. A large control group also has been observed. A preliminary tabulation showed an attack rate of 0.76 per 1,000 in children originally Dick negative or treated, as compared to 4.81 in the untreated controls. For example, in the 6-year-old children the attack rates were 1.03 and 9.74, respectively. Further study is needed in order to observe the durability of this form of immunization.

Rheumatoid arthritis.—A laboratory study of this disease was begun near the close of the preceding fiscal year. A good deal of basic laboratory work has been completed, but these findings have not as yet been correlated with the disease process in man.

Gonococcus and gonococcal infection.—Studies on the biology of the gonococcus with special emphasis on chemical fractions and possible serologic types have been initiated, with the objective of producing a more satisfactory antigen for use in the diagnostic complement fixation test.

Amebiasis.—Studies on the biology of *Endamoeba histolytica* and the influence of its bacterial associates *in vitro* during excystation, and the multiplication of trophozoites and encystation were carried on with the Division of Zoology.

Organisms resembling B. pseudomallei.—A detailed study was made of three organisms closely resembling *Malleomyces pseudomallei* (*B. whitmori*) which were isolated from blood cultures submitted by the Waycross Branch Laboratory, Georgia Department of Public Health.

Tularaemia.—In 1939, a total of 2,291 cases of tularaemia was reported from 41 States and the District of Columbia as compared to a total of 2,081 cases in 1938. Studies on the distribution of tularaemia in animals in nature were carried out. The disease is present in muskrats, field mice, and beaver in Montana. *Bacterium tularense* was also recovered from the water of some of the streams and pools in that State.

Chagas' disease.—Field studies and experimental data obtained in the laboratory showed that two species of blood sucking insects (*Triatoma gerstakeri* and *Triatoma heidemannii*) were naturally infected with *Trypanosoma cruzi* in the State of Texas.

Weil's disease.—Thirty-seven human cases of Weil's disease were diagnosed by agglutination tests; 6 of these cases terminated fatally.

The 37 cases occurred in the following States: Connecticut, Louisiana, Maryland, Massachusetts, Michigan, Missouri, Nevada, New Jersey, New York, Ohio, Pennsylvania, Virginia, West Virginia, and the District of Columbia.

The disease was found also in dogs in Louisiana, New York, Pennsylvania, and Virginia, and in rats in the District of Columbia. It was proved that albino deer mice (*Peromyscus maniculatus gambelii*) are susceptible to *Leptospira icterohaemorrhagiae* and are useful laboratory animals for studying Weil's disease.

Epidemic jaundice.—A small epidemic of about 200 cases occurred in Austin, Minn. Not only school children but also adults were affected. The etiologic agent appeared to be a filterable virus. No evidence of leptospirosis was found among the patients. During the year an epidemic of infectious jaundice in St. Mary's County, Md., was studied; no etiologic factor was isolated.

Yellow fever.—Studies on yellow fever were continued in Brazil under the auspices of the International Health Division of the Rockefeller Foundation and the Department of Public Health of Brazil. A report was prepared covering the recent advances in this field with particular reference to control measures of importance to the United States of America. A series of yellow fever vaccination clinics were held in Texas under the direction of the State department of health for the purpose of immunizing medical and technical personnel. The establishment of a yellow fever laboratory unit was undertaken.

DIVISION OF PATHOLOGY

Surgeon R. D. LILLIE in charge

The amount of experimental pathological material studied during the current fiscal year increased somewhat over that in the preceding year, including a total of 2,303 animal autopsies.

Studies were made on the pathogenesis and pathology of experimental poliomyelitis in monkeys, mice, and cotton rats; lymphocytic choriomeningitis in mice; influenza in ferrets and mice; pertussis in rats and mice; Rocky Mountain spotted fever in various rodents and monkeys; endemic typhus in guinea pigs and various other rodents; melioidosis in guinea pigs; malaria in canaries; trypanosomiasis in mice; leptospirosis in mice (*Peromyscus maniculatus gambelii*), and various other wild rodents; "nine-mile" and "Q" fevers in guinea pigs; lymphopathia venereum in mice; tularaemia in various rodents; rabies in mice; amebiasis in cats; vitamin C and calcium deficiency in rats; ascariasis in rabbits; blacktongue in dogs; filtrate factor deficiency in rats; tuberculosis and leprosy in rats; and phosphorus deficiency and poliomyelitis in rats.

Studies were made of the pathology produced by various toxic substances including cystinamine, selenium, aminoazotoluene, fluorine, mineral oil, croton oil, and alcohol. A number of animals were examined in connection with studies on the etiology of certain tumors of lymph nodes in man. Basic pathology of spontaneous diseases of laboratory animals is being continually studied.

The effect of the administration of pantothenic acid on the histopathology of filtrate factor deficiency state in rats has been studied. It was found that this substance causes arrest and repair of the

adrenal lesions, improvement of testicular function, and hyperplasia of tibial epiphyseal cartilage with acceleration of skeletal growth.

The study of experimental poliomyelitis in cotton rats and mice has shown that, regardless of the intracerebral route of inoculation, the first specific lesions appear in the spinal cord, thus supporting the theory of elective localization of viruses.

The study of the topographic distribution of the brain lesions of poliomyelitis was continued and extended with aid received from the National Foundation for Infantile Paralysis. Pathologic materials were obtained from the 1939 outbreak in the Middle West.

The study of the pathology and bacteriology of pulmonary calcifications occurring in children in the central Tennessee area was extended to include material from Cincinnati, Ohio, and Lexington and Louisville, Ky. To date, material from 19 suitable cases has been obtained.

Studies on the incidence and concurrent pathologic alteration of appendicial pinworm infestation, and of the type and incidence of malignant tumors in Public Health Service beneficiaries according to age, sex, race, and occupation have been summarized in preparation for forthcoming reports. The study of the post-mortem pathology of untreated syphilis in Negroes, initiated several years ago in cooperation with the Division of Venereal Diseases, has been continued. Six autopsies were added during the year, bringing the total to 45.

Autopsy material from other infectious diseases was received from 11 cases of poliomyelitis; 3 of Weil's disease; 5 of Rocky Mountain spotted fever; 4 of tularaemia; and single cases of bacillary dysentery, encephalitis, and trichinosis.

Technical studies on the effect of pH and buffers in formalin on the stainability of tissues have been continued, a 4-year test now being in its second year. In general, previous indications have been confirmed. Examination of certain synthetic resins has been undertaken to determine their suitability as mounting media for sections stained with thiazin dyes. Studies have been made of the thiazin dyes to determine their availability for staining malaria parasites. A satisfactory dye mixture, composed entirely of domestic dyes, has been developed in cooperation with the malaria laboratory. Improvements have been made in connective tissue stains and further studies of the dye chemistry involved in these stains are in progress.

During the year, 1,851 surgical specimens and material from 242 autopsies were received from marine hospitals, prison hospitals, Indian Service hospitals, and other institutions. This material supplied the human pathologic material previously referred to and further served for the training of junior officers in descriptive and diagnostic pathology.

DIVISION OF PHARMACOLOGY

Chief Pharmacologist M. I. SMITH in charge

SELENIUM STUDIES

Influence of diet on toxicity.—Investigations have shown that the chronic toxicity of selenium, whether from natural sources or when administered as the inorganic selenite or selenate, is related to dietary protein. Within certain limits, the effects of the continued ingestion

of selenium at a given level are determined by the protein-selenium ratio in the diet. Liver cirrhosis, anemia, and effusions resulting from the ingestion of 10 p. p. m. selenium may all be prevented by the inclusion of sufficient protein to bring up the protein-selenium ratio to an optimum level. Studies with various proteins have shown that wheat protein, the milk proteins, ovalbumin, gelatin, and the proteins derived from brewers' yeast and liver are equally effective. Of the three amino acids so far examined (lysine, cystine, and methionine), none has proved of value.

The metabolic fate of selenium in the body.—It had previously been shown that the continued ingestion of selenium results in considerable storage of the element in the various tissues and organs of the body. Studies were made on the distribution of selenium in the plasma and tissue proteins. These indicated that it is most intimately associated with the globulins. Enzymatic hydrolysis of the liver proteins with pepsin or trypsin released the selenium compound or compounds from its protein combination. Fractionation of such hydrolysates showed the selenium to have physico-chemical properties different from those of inorganic selenium compounds or the selenium analogue of cystine but resembling those of a selenium dicarboxylic acid. The chemical nature of the selenium compounds in the tissue has not been identified. Parallel fractionation of the selenium and cystine in the enzymatic hydrolysates indicates lack of any close association.

The effect of selenium on metabolism.—A study has been made of the effects of intravenously injected selenium compounds on the blood sugar, the liver glycogen, and the sugar tolerance. An elevation of the blood sugar level has been found in rats and rabbits following the injection of toxic doses of selenium compounds. The liver glycogen was reduced. In fasting animals, the simultaneous administration of glucose and selenium resulted in more prolonged and more pronounced hyperglycemia with decreased deposition of liver glycogen. The experiments indicated that this is due to interference with glycogenesis. On the supposition that these effects might be caused by interference with the phosphorylating mechanism, the influence of selenium on serum phosphatase was studied with negative results.

CHEMOTHERAPY

Relation of chemical structure to antibacterial action.—Three series of active compounds entirely different from sulfanilamide were obtained. These comprised derivatives of arsenic, phosphorus, and nitrobenzoic acid. Many were new compounds not previously described. These numerous derivatives showed that the sulfanilamide group was not essential to activity, but all possessed in common a free, oxidized, or substituted amino group in the para position. If the amino group was substituted, it was shown that the body split off the free amino group if the compounds were active. *In vitro* studies, with certain exceptions, were in general accord. These findings established certain general principles in the chemical approach. The phosphorus compounds were the most promising in the series because of their relatively low toxicity and considerable antistrep-tococcal activity. No activity was found upon the influenza virus, but other infections not influenced by sulfanilamide are being studied.

Streptococcus viridans.—Organisms from bacterial endocarditis were rendered mouse-virulent by growing them in mouse blood broth and injecting them in mucin. Therapeutic activity of a series of compounds was inferior to that upon beta hemolytic streptococci, sulfapyridine and sulfathiazol being best.

Sulfanilamide metabolism.—Contrary to general belief it was shown that the sulfonamide radical is not stable. Oxidizing agents including ultraviolet light cause a rapid breakdown of the molecule, liberating inorganic sulfur and ammonia.

After sulfanilamide therapy certain changed products (either oxidation or conjugation products) were demonstrated in the urine. Methemoglobin studies *in vitro* indicated that the methemoglobinemia is due to an oxidation product, probably the hydroxylamine.

STUDIES IN ANEMIA

Nutritional microcytic anemia has been produced in rats by feeding a protein-free diet supplemented with synthetic vitamins of the B group. Experiments were made to determine the reticulocytogenic effect and the hemoglobin-building capacity of various protein supplements. The results so far obtained have indicated that proteins differ widely in their ability to induce reticulocytosis and the formation of new red cells. The effects of individual amino acids used to supplement proteins which are known to be deficient are under investigation.

CHEMICAL CONSTITUTION AND PHARMACOLOGIC ACTION

The pharmacologic properties of several compounds synthesized in the Division of Chemistry were investigated for possible therapeutic merits. A study of the glucoside of choline, β -tetra-acetylcholine d-glucoside, showed that it had none of the vasodilator properties characteristic of choline esters nor the vasoconstrictor action characteristic of some of the ethers. The augmentor effect on smooth muscle characteristic of choline was also abolished.

Three benzimidazol substitution products with sugar residues substituted in the [2] position of the glyoxaline nucleus were examined for their systemic effects, general toxicity, and effects on the circulation, respiration, and smooth muscle. These compounds were less toxic than benzimidazol. Their effects on the central nervous system and on the circulation were similar to but less pronounced than those of the parent substance.

MISCELLANEOUS AND COOPERATIVE STUDIES

At the request and with the cooperation of the Bureau of Internal Revenue, pharmacologic studies were undertaken on the cathartic, irritant, and vesicant properties of croton oil. A series of fractions were derived therefrom by chemical fractionation. Methods have been worked out for the quantitative estimation of the cathartic potency of the fractions and their irritant properties. Extraction of a petroleum ether solution of croton oil with methyl alcohol appears to yield a resin containing all the activity of the oil. Fractionation of the resin is in progress.

In cooperation with the League of Nations Health Committee on Drug Standardization, work was done on the physiological assay of a new lot of international pituitary standard for its oxytocic, pressor, and antidiuretic potency. The results of these tests indicate that the standard pituitary powder introduced in 1924 and adopted in 1926 has retained its potency for 13 years with little change.

In cooperation with the Work Projects Administration, assays were made of several samples of the dried and powdered leaf of domestic digitalis to ascertain the influence of altitude and drying conditions on the active principles.

Ninety-six memoranda and scientific opinions were prepared during the year, including pharmacological testing and analysis of material of a toxicological nature.

Scientific opinion and court testimony were given on behalf of the Federal Trade Commission and the Food and Drug Administration in 16 cases.

DIVISION OF PUBLIC HEALTH METHODS

GEORGE ST. J. PERROTT in charge

The major function of this Division is the development of experimental methods in public health practice, supplemented by such technical studies as may be necessary to appraise the nature of a given public health problem. The Division seeks to develop and evaluate experimental methods applicable to the solution of the health problems of groups of people.

HEALTH AND MEDICAL SERVICES

Public medical care.—Tax supported medical care is now being provided, mainly by State and local welfare agencies, to the millions of persons in this country who are in receipt of one form or another of public assistance. The provision of medical care to these individuals along with medically indigent persons entails an expenditure which approaches or exceeds the aggregate budgets for all Federal, State, and local health departments. In large part this activity goes forward without the benefit of medical direction or supervision and without coordination with the activities of public health agencies. A beginning was made during the year on a systematic study of this form of public medical care. At the invitation of the New York Department of Social Welfare, surveys were made in a number of localities in New York State which give a comprehensive picture of the provision of public medical care in these communities, the costs of this care, the volume of services provided, and permit some evaluation of the quality of care and of the effectiveness of the programs as a whole.

Hospital care.—The greatly increased interest in the need for more hospitals, especially in rural areas, has resulted in a constantly increasing volume of requests for technical information and advice on many hospital problems. Special attention has been given to the problems of the small hospital. Methods have been developed for State surveys to determine the location of needed new facilities. A study of the minimal national need for additional general hospital facilities in rural areas indicated a need for at least 270 new hospitals

ranging in size from 30 to 100 beds and including a total of 15,500 beds.

Dental care.—Studies have been made of the prevalence of accumulated dental neglect in various age groups, of the annual incidence of new carious lesions, and of the probable costs of meeting the problem of dental disease. The studies indicated the importance of beginning an attack on the problem by meeting the dental needs of children.

NUTRITION

A cooperative study in New York City has for its main objective the development of methods for diagnosing the subclinical forms of the specific nutritional deficiencies. Improvements in technical procedures made during the year suggest that it soon may be possible to formulate a system of physiological, chemical, and functional tests of nutritional status which may be applied on a broad public health scale. Results based on examinations of both adults and high school students also furnish preliminary data for estimating the prevalence of vitamin A, vitamin C, iron, and riboflavin deficiencies.

HOUSING AND HEALTH

The definite relation of adequate housing to health necessitates much more consideration of the subject than has been undertaken by health agencies in the past. Analyses of National Health Survey data have shown significant correlations between frequency of illness and crowding, marked increase in the incidence of pneumonia and tuberculosis with increase in crowding, earlier age incidence of communicable diseases of childhood in crowded households, and increase in frequency of home accidents as rental (or value) of dwellings decreased. Other studies indicated wide regional differences in the availability of various types of sanitary facilities. At the request of the United States Housing Authority, a member of the staff of the Division has been assigned to the Authority to assist in resolving questions of housing and health interrelationships.

HEALTH EDUCATION

Personnel.—A survey of the educational attainment and experience of full-time professional workers in official health departments has been completed. Detailed personnel blanks were received from some 18,000 employees in 1,100 State, county, and municipal health departments and 5 reports were prepared for publication.

Public health nursing.—From data previously collected in a study of the educational activities of public health nurses, a handbook containing 22 complete verbatim transcripts of nurses' home visits was prepared and distributed for use by instructors and supervisors of public health nursing.

Sanitation inspection services.—With the cooperation of the New York Health Department, a study has been undertaken to evaluate the educational activities of sanitation workers employed by official health departments. As a part of the study, stenographic records are being taken of the verbal content of sanitation inspectors' visits on complaint and original inspections. The information obtained

will be valuable to health officers since it will include an analysis of the nature of inspection services and their effectiveness in promoting better environmental sanitation.

Visitor reaction study.—A study was inaugurated last year at the New York World's Fair to ascertain the amount of health information possessed by the general public and to evaluate health exhibit techniques. During the course of the study more than 50,000 completed general and specific health information tests were collected at the Medicine and Public Health Building. These tests have been processed and are now being analyzed.

CONTROL OF SPECIFIC DISEASES

Tuberculosis.—An intensive study of 700 children indicates that nearly all children will react to tuberculin if a sufficiently large dosage is given. Factors other than tuberculosis are apparently involved in skin sensitivity, although in general the test is specific in low dosages. Studies in progress are directed toward a determination of the relationship of constitutional factors to the tuberculin reaction. Preliminary technical evaluation and clinical application of the 35 mm. microfilm X-ray in State institutions in Minnesota indicate that this method may be applied in routine tuberculosis case-finding programs.

Cardiometric studies.—Analyses of electrocardiograph and electrostethograph records on nearly 6,000 school children have been made to determine the further usefulness of these techniques in routine health examinations. Additional work has dealt with an evaluation of findings from stethograph records as compared with routine auscultation of the heart and with a search for relationships between cardiometric findings and the state of nutrition.

Rheumatic fever.—A check has been made of every absence from school of 3 days or more, plus physicians' reports of all children and adults with rheumatic manifestations, in an epidemiological study of this disease in Hagerstown, Md.

Pneumonia.—The evaluation study of respiratory disease therapy was continued and should provide useful and otherwise unobtainable information both to clinicians and to administrators of pneumonia-control programs. The survey of pneumococcus type incidence was completed in its laboratory phases. The study has already promoted marked improvements in diagnostic procedures in large areas of the country and has resulted in the development of a standard micro-method for blood sulfapyridine level determinations which has proved satisfactory for clinical use and has been widely adopted. Consultation services have been rendered to a number of State health departments. As a result of programs now in active operation in 33 States, several thousand human lives have been saved and periods of disability due to pneumonia have been reduced by many thousands of days. Instruction in the bacteriological and immunological diagnosis of pneumonia, in biochemical determinations to guide chemotherapy, and in related clinical laboratory procedures was given to about 940 laboratory directors, clinical pathologists, and technicians from public health, hospital, and private laboratories in 12 States.

Diarrheal diseases.—An epidemiological study is being made in the Ohio watershed as to the possible relation between the sanitary

quality of public water supplies which are obtained from polluted streams and the occasional outbreaks of intestinal disturbances among populations using such drinking waters. A complete mobile laboratory is equipped for immediate dispatch to any locality reporting an explosive epidemic of possible water-borne disease.

Dental caries.—Investigations were continued on four major aspects of the caries problem: (a) On the dental status and needs of representative population groups; (b) on methods for evaluating the efficacy of public health dental procedures; (c) on empirical methods for the prevention of the initiation of caries; and (d) on the etiology of caries. Published reports indicate that socioeconomic status and general hygienic conditions are not related closely to dental caries and that the loss of permanent teeth in children is not an entirely satisfactory measure of dental services received. Studies in progress point to the fact that silver nitrate applications to the permanent teeth appear to have little value in the prevention of caries and that there is great need for experimental work on other empirical methods for the control of the disease. Other studies show the relationship between "tooth age" and attack of the different morphological types of teeth by caries and indicate the lack of direct correlation between chronological age and dental caries.

Hearing defects.—Four articles were issued during the year, based on a continuation of analysis of audiometric and otolaryngologic examination data, which were obtained on a random sample of 9,324 persons of the general population in 1936. This analysis revealed that cases of deafness reported on the National Health Survey schedule represent on the average hearing losses in excess of 45 decibels for sounds in the speech range. This fact permitted using Health Survey data as a means for deriving estimates on annual incidence of known types of deafness in the general population. Other phases of the analysis provided direct information, which is being used commercially as a basis for improving the design of hearing aids.

ENVIRONMENTAL SANITATION

Sewage treatment.—The biological and biochemical factors underlying the complex process of oxidation and assimilation of organic matter in liquids, particularly as they function in the treatment of sewage and in natural purification of waters, have been further explored. Work with the predominant bacteria in the activated sludge process of sewage purification has been completed and similar studies of trickling filters are nearing completion. The results of these studies should be of value in orienting our knowledge of this little known group of bacteria and in serving as a guide for the proper operation of purification systems.

Scioto River study.—A comprehensive study of this stream was undertaken to evaluate the sanitary improvement that might be expected to result from the complete treatment of contributed sewage and industrial wastes. Following the completion of over 2 years' observation by a field laboratory at Chillicothe, Ohio, the extensive analytical data are being critically reviewed in preparation of a report on this work which is nearing completion. Collateral studies have also been undertaken further to clarify the function of certain of the plankton and bottom sediment organisms in the natural purification process.

Inventory of sanitation works.—Data on sewage treatment plants, sewerage systems, and water treatment plants are virtually complete for 38 States and nearing completion for 6 additional States. It is planned first to prepare directories of these systems in the various States.

Illinois Waterway pollution.—At the request of the United States Army Corps of Engineers, a continuing check is being maintained on the observations made by the Sanitary District of Chicago concerning the sanitary condition of the Illinois Waterway between Chicago and Peoria, Ill.

Ohio River survey.—In accordance with a decision of the Ohio River Committee in February 1940, it was necessary to redraft working plans of the cooperative study with the United States Army Corps of Engineers in order to complete all field and laboratory work by the end of the calendar year 1940. Staff and equipment have been increased accordingly, including four new mobile laboratory units, two new motorboats, and other laboratory apparatus. A new scheme for the sanitary classification of stream waters in the Ohio River Basin has been devised, based on laboratory measures of pollution, which is of value in showing present sanitary conditions and for estimating the extent and probable cost of corrective measures. On its present scale, the survey is by far the most comprehensive one of its kind ever undertaken either in this country or abroad.

Analytical procedures.—Certain analytical procedures used in water pollution work have been improved, including determination of dissolved oxygen in the presence of interfering materials, modification of the biochemical oxygen demand test as applied to acid- and iron-bearing waters and bottom sediments, and an improved procedure for determination of small amounts of soluble phosphates in water and sewage.

Paraffining of containers.—Consideration has been given to the bactericidal effect of the paraffining process for paper milk containers which are waterproofed by paraffining at temperatures of 160°–180° F. Studies completed during the year indicated a mean 99 percent reduction of the test organism, *Escherichia coli*, on small pieces of container board after paraffining for 10 seconds at 180° F., 20 seconds at 175° F., 35 seconds at 170° F., and 4 minutes at 160° F.

Food sanitation studies.—At the request of the Committee on Shellfish Sanitation of the Conference of State and Territorial Health Officers, this Division began an investigation of present-day oyster scoring techniques at a laboratory set up on Craney Island. The Virginia State Department of Health provided financial assistance and cooperation in studying the problem in the Hampton Roads area. The study has revealed a number of problems with regard to the significance of bacteriological standards used in water and food analysis and it is expected that the results of the study will be of value in improving bacteriological techniques used in public health laboratories.

HEALTH STATISTICS

Studies of the incidence of births, deaths, and sickness in relation to age, sex, income, occupation, and other environmental factors continue to be a major function of this Division.

Current reports.—Provisional mortality summaries are prepared on a quarterly basis from data supplied by State health departments. These summaries, which contain data for preceding years, provide the earliest available comparative material on mortality in the United States.

National Health Survey.—A number of final reports relating to the general findings of the surveys were prepared during the year. In addition to establishing the level of rates of frequency and severity for serious illness, chronic disease, accidents, and impairments, the survey has shown that high illness rates, lack of medical care, and low income go hand in hand. Persons with low income living in small cities and rural areas were at a particular disadvantage, especially with respect to hospitalization.

Cancer, mortality and morbidity.—The statistical study of cancer mortality was continued into the present fiscal year. Two bulletins on the trend of cancer during the past 20 to 40 years have been published, a third on State to State variation in mortality at the present time has been completed, and the fourth and final bulletin on the age incidence of cancer of the various sites is in preparation. The study of the incidence of cancer begun in 1938 was continued and reports from physicians, hospitals, and clinics located in seven urban areas have now been obtained.

Classification of disease.—Hospitals, clinics, and other organizations publishing annual and special reports which show the number of cases of different diagnoses have need for a standard list for tabulating causes of illness. The ordinary nomenclature used in a hospital is too detailed for statistical purposes. To meet this need, the Public Health Service in cooperation with various hospitals and clinics is setting up a tabular list together with an alphabetical index. When published, this list should be of value in standardizing coding and tabulating procedures of special studies of morbidity and in the routine reporting of hospital and other morbidity statistics.

Baltimore survey.—The study of illness and medical care among 1,500 white families of the Eastern Health District of Baltimore, Md., was continued throughout the fiscal year. Wide differences in the rate of illness and in receipt of medical care were found among families in different income groups. The most striking difference exists in the extent of dental care, where the rate of extractions is about the same in all income groups but the rate of fillings is about six times as high among families with incomes of \$5,000 and over as among families with incomes of less than \$1,200. These sets of records will afford the most complete and accurate data yet available on illness and medical care in the general population.

Differential birth rates.—An analysis of the differential birth rates and potential rates of growth of various income and educational groups of the urban population of the United States was prepared for publication.

Negro health.—A research monograph on the health of the Negro discussing the amount of fatal and nonfatal illness, the prevalence of physical defects and impairments, diet, nutrition, health facilities, and medical care was prepared for publication.

Familial studies.—Records collected at Hagerstown, Md., during the past 20 years formed the basis of intensive studies in which the family is the fundamental unit of investigation. Published reports

deal with changes in age at marriage and with the contributions of the different socio-economic classes of families to natality, mortality, and morbidity. Utilizing routine birth and death certificates, deaths of both mothers and infants were related to such factors as premature births, parity, and age of parents. Of particular interest was the finding that the age of the father is closely related to survival of his offspring.

DIVISION OF ZOOLOGY

PROFESSOR WILLARD H. WRIGHT in charge

Laboratory and field studies were continued on the problems of trichinosis, oxyuriasis, ascariasis, and amebiasis.

TRICHINOSIS

Incidence and epidemiology.—Additional examinations were made in an effort to determine the incidence of the trichina parasite in certain population groups not previously studied and to secure further information which might be of value in formulating measures for the control of trichinosis.

Further random samplings of diaphragm material from hospitals selected on a chance basis have brought the total number of examinations in this series to 942, of which 173, or 18.4 percent, were positive for trichinae.

In an examination of 238 diaphragms from individuals who had resided on farms or in villages of 1,000 population or less, 25, or 10.5 percent, were found positive for trichinae. Effort is being made to determine whether any marked differences exist in the exposure to trichinosis of individuals residing in rural areas.

Because of the criticism that a previous trichina infection may have influenced the hospitalization of individuals from whom necropsy material has been obtained, examinations have been made of diaphragms from persons meeting traumatic death and not hospitalized. The incidence of trichinae in such cases is not materially different from that obtained in hospitalized cases, since 47, or 18 percent, of 261 examinations were positive.

The above-mentioned examinations, together with those reported previously, have brought the total number of diaphragms examined to 4,654, of which 768, or 16.5 percent, were positive.

Examinations were made of 271 composite 100-gram samples of pork scraps picked at random from municipally collected garbage which is principally fed to swine. Six of the composite samples were positive for trichinae, thus providing additional evidence that raw garbage is of importance as a source of trichinosis in swine primarily and in man secondarily.

The examination of 35 human diaphragms and 50 swine diaphragms at San Juan, P. R., with negative results tends to confirm the prevailing belief that trichinosis is very rare or absent in the island.

Effort has been made to evaluate in terms of clinical trichinosis the significance of larval counts in routine diaphragm examinations. Through the cooperation of several practicing physicians, counts of trichina larvae have been made on samples of biopsied muscle from recovered cases of trichinosis and on samples of various muscles re-

moved at autopsy from fatal cases of the disease. Evidence obtained to date would seem to warrant a revision of opinion concerning the number of larvae per gram needed to produce clinical symptoms and it appears probable that relatively light infections may cause serious illness.

Biology.—Further work has been done in connection with the individual variation in the susceptibility of laboratory animals to trichina infection. Considerable differences were noted in the number of worms developing in litter mates infected with identical numbers of larvae. Second generation animals infected with similar doses of larvae of the strain received by their parents likewise showed the same individual variation in response to infection although in all cases they were less heavily infected. While not yet complete, experiments with third generation animals gave similar results in the way of variation in susceptibility to infection although there was no continued decrease in the amount of infection. The extreme variability in susceptibility to infection seemed to be correlated with the number of adult worms developing from a given dose of larvae rather than with the larval production of female worms. In a further attempt to evaluate some of the factors involved, it was found that the feeding of encysted larvae resulted in better infections in albino rats than did excysted larvae. Larvae from infections less than 21 days old failed to produce infections in rats. Counts of adult trichinae in the intestine of rats showed that the ratio of males to females varied from 1:0.78 to 1:5, with an average of 1:2.3. The sex of the experimental animal apparently had no influence either on the sex ratio of the worms or on the intensity of the resulting larval invasion of the muscles.

Diagnosis.—The specificity of the trichina antigen developed in this laboratory was checked in Puerto Rico, where evidence indicates that trichinosis is a very rare condition. Of 122 individuals selected at random, none gave a typically positive reaction to the intradermal test although 8 showed a zone of erythema surrounding the site of injection. Blood serum for precipitin tests was obtained from 5 of these 8 cases and these tests were negative. The individuals in question were infected with various nematode and trematode parasites. The findings suggest that the antigen is species specific and, when used in the manner and in the dilution directed, will probably not give positive reactions in helminth infections other than trichinosis.

During the year, 5,448 intradermal doses of trichina antigen were forwarded to physicians and hospitals in the United States and foreign countries. Precipitin tests were conducted on 126 samples of blood serum, of which 63 were positive.

Therapy.—Experiments designed to develop a specific treatment for trichinosis were continued. A total of 121 different chemical compounds were tested on 3,846 experimental animals, but no promising results were obtained.

OXYURIASIS

Incidence and epidemiology.—During the year, NIH swab examinations were made on 1,400 individuals, of whom 21 percent were found infected. To date, approximately 5,200 persons have been examined, of whom 30 percent have been positive for pinworms. As in previous years, a lower incidence was found in Negroes than in

white persons. In the general population of Washington, D. C., 13 percent of 1,100 Negroes have been found infected as compared with 41 percent of approximately 2,900 white persons. A corresponding difference, as represented by incidences of 5 percent and 17 percent, respectively, was found in comparable samples of the 2 races in other widely scattered parts of the United States. Of 400 Latin Americans in Puerto Rico and Florida, 16 percent were found positive.

The extent of familial infection was investigated further. In all, approximately 5,600 NIH swab examinations have been made on the members of 312 pinworm-infected families. In 279 white families, 72 percent of the children and 36 percent of the adults examined were positive, while in 33 Negro families, 49 percent and 8 percent, respectively, were positive.

Biology.—In order to secure information needed for the development of control measures, tests were made to determine the length of survival of infective pinworm ova under known conditions of temperature and humidity. Variation of the survival rate was correlated directly with the conditions under which the ova were maintained. Ability of eggs to survive decreased with a rise in temperature and/or a reduction in moisture. A characteristic curve resulted when the percentage of survival was plotted against time of exposure, the drop occurring more rapidly with increasing heat and/or dryness. There was a definite reduction within 24 hours in the survival of eggs exposed to relative humidities below 50 percent and temperatures above 28° C. For example, less than 10 percent survived 2 to 3 hours at a relative humidity of 38 to 41 percent and a temperature of 36° to 37° C.; none survived 16 hours under the same conditions. At temperatures of 20° to 24.5° C. and relative humidities ranging from 53 to 91 percent, 30 percent of the eggs survived 6 days' exposure. Under all the conditions tested, a few eggs survived a relatively long time after the majority were killed.

Additional attempts were made to infect albino rats on a vitamin A deficient diet in order to study the development of the human pinworm experimentally. Larvae showed partial development but failed to survive in the rat for longer than 8 days.

Preliminary experiments were conducted to test the effect on pinworm eggs of various gases used as fumigants. Under the test conditions, naphthalene, paradichlorobenzene, and hydrocyanic acid gas failed to exhibit a lethal effect on ova containing infective embryos.

Therapy.—Control of pinworm infection was attempted in three groups of institutionalized children at New Orleans. In one group, unusually rigid hygienic measures were instituted and carried out over a period of 6 weeks. At the end of that time, a material increase in the incidence of infection was noted. Children in the two other groups were given gentian violet therapy, as a result of which 90 percent were freed of infection.

ASCARIASIS

Pathology.—In preliminary experiments begun during the preceding fiscal year and designed to ascertain the effect on certain tissues of long continued exposure to the migrating larvae of *Ascaris lumbricoides*, a few laboratory animals were subjected to frequent oral feedings of embryonated *Ascaris* ova over a period of several months.

At the termination of the experiment, the majority of the test animals showed pulmonary lesions grossly indistinguishable from those of some other diseases, while the lungs of the control animals maintained under the same conditions and not fed *Ascaris* ova were apparently normal. Additional studies are under way to confirm these findings and to investigate other phases of the problem. The work is being done in cooperation with the Division of Infectious Diseases.

AMEBIASIS

Incidence.—Studies were continued by the Tulane Amoebiasis Unit, New Orleans, La. The examination by means of direct smear, zinc sulfate flotation, and hematoxylin film preparations of 6 stool specimens from each of 119 children in an institution in that city showed that 48, or 40 percent, harbored *Endamoeba histolytica*. At Washington, D. C., 121 patients referred by physicians were examined and 6 were found positive for the parasite.

Diagnosis.—At Washington, cultural studies have been continued in an effort to develop refined antigens for diagnostic purposes. A specially devised micro-manipulator has been useful in isolating bacteria-free cysts of *E. histolytica* from cultures and from human stools. Excystation and growth of the organism have been obtained in symbiosis with single species of bacteria but not in pure culture without bacteria. Most satisfactory growth has been secured in cultures seeded with *Escherichia coli communis*, *E. coli communior*, an unidentified species of the coli-aerogenes group, or with a hemolytic streptococcus.

Antigens prepared from cultures of *E. histolytica* containing not more than 3 species of bacteria have been used for the production of specific antisera in rabbits. In complement fixation tests on human sera, these antigens have given positive results in clinical cases but negative or doubtful results in nonsymptomatic carriers.

At New Orleans, additional tests have been made in the way of improving the zinc sulfate centrifugal flotation technique for the isolation of protozoal cysts and helminth ova from stools. The optimum centrifugalization time for the maximum recovery of cysts of *E. histolytica* was found to be a total of 70 seconds, or 50 seconds at maximum speed of the equipment employed. The results indicated also that cysts of other species of protozoa and the ova of helminths differ from *E. histolytica* in this respect and that each has a specific optimum centrifugalization time.

Pathogenicity.—Four strains of *E. histolytica* obtained originally from nonsymptomatic carriers in Georgia have been found to possess extremely low pathogenic indices when tested on kittens.

At New Orleans, the pathogenicity of various strains of the organism was studied by means of the complement fixation test on healthy carriers and by animal inoculation of cultures. Strains recovered from the stools of such individuals have consistently produced lesions when inoculated into the intestinal tract of dogs and the blood serum of the persons involved gave strongly positive reactions to the complement fixation test. The results would seem to indicate that at least some strains of *E. histolytica* are potentially dangerous even though their presence may not be associated with any demonstrable symptoms of disease.

NATIONAL CANCER INSTITUTE

Pharmacologist Director CARL VOEGTLIN in charge

NATIONAL ADVISORY CANCER COUNCIL

The National Advisory Cancer Council met three times. A considerable amount of work was done by special committees composed of Council members and other experts. Thirty-four new applications for grants-in-aid and 2 carried over from the previous fiscal year were considered and 17 were recommended as follows:

Michael Reese Hospital (\$3,600).	Factors in the initiation of induced and spontaneous tumors.
University of Cincinnati (\$2,400).	To improve present methods of diagnosis and treatment of cancer.
University of Cincinnati (\$4,020).	Gastric carcinoma and its relation to chronic atrophic gastritis.
Duke University (\$1,000).	Properties of papilloma virus protein and related material.
University of California (\$1,800).	Urinary gonadotropic hormone coincident with various testicular neoplasms.
National Research Council (\$3,000).	Maintenance and progress of the American Registry of Pathology.
University of Chicago (\$3,500).	To trace and fractionate carcinogenic substances from tissue and urine of cancer patients.
University of Michigan (\$450).	Biological comparison of X-rays and neutrons.
Meharry Medical College (\$1,100).	Development, research, and maintenance of tumor clinic.
Roscoe B. Jackson Memorial Laboratory (\$18,000).	Genetic research.
New York Hospital (\$4,400).	Early diagnosis of gastric cancer.
Barnard Free Skin and Cancer Hospital (\$5,000).	Integration of changes in experimental carcinogenesis.
Memorial Hospital (\$3,300).	Means of increasing response of tumors to radiation.
Washington University (\$16,000).	Application of the cyclotron and products to treatment and study of cancer.
Dr. Edward W. Wallace (\$1,500).	Effect of climatic temperature upon induced, inoculated, and spontaneous cancer in experimental animals.
University of California (\$5,000).	Treatment of cancer by fast neutrons produced by the cyclotron.
American College of Surgeons (\$7,900).	Study of hospitals and clinics for further needs to provide adequate clinical cancer service.

A total of \$61,380 was paid out for grants-in-aid, including 10 grants recommended during the current and 3 recommended in the previous fiscal year. The terms of 2 members of the Council, Dr. Ludvig Hektoen and Dr. C. C. Little, expired. Dr. George M. Smith of Yale University and Dr. Max Cutler of the Chicago Tumor Institute were appointed to fill the vacancies.

CANCER RESEARCH

Twenty-three research fellows were on duty, 15 working at the National Cancer Institute and 8 in private institutions.

Lung cancer.—The biological testing of carcinogenic compounds with regard to induction of pulmonary tumors in mice has been put

on a quantitative basis. Lung tumors were induced in A strain mice by pure 2-amino-5-azotoluene, 3,4-benzpyrene, 1,2,5,6, or 1,2,7,8-dibenz-acridine, and three other cyclic compounds. Chronic irritation, following intravenous injection of arsenopyrite, chromite, thorite, or quartz did not produce pulmonary tumors in A mice. Genetic studies showed that when mice of strains C₃H and I were crossed the resultant hybrids were more susceptible to induced lung tumors than either parental strain. Evidence was also obtained indicating that the gene (or genes) for susceptibility to induced lung tumors is not linked with the gene for leaden coat color, piebald, dilution, light-bellied, or brown. Inheritance of susceptibility for induced lung tumors is probably due to multiple factors.

Specimens of air dust from Pittsburgh, New York City, Chelsea, Mass., and the Holland Tunnel were obtained and extracted preliminary to testing of the extracts for cancer-producing properties. An improved dust collector was designed with the advice of the Chemical Warfare Service.

Breast cancer.—Past work on the influence of heredity on the incidence of breast tumors in mice has emphasized the maternal factor. Recent work indicates that a paternal factor also is active.

The foster-nursing studies were continued. It is known that when the new-born young of a strain of mice with a high breast-tumor incidence are foster nursed by a female of a strain resistant to this type of tumor, the fostered mice developed few breast tumors. Recent work has shown that the reverse is also true. Evidence was secured by transplantation experiments indicating the presence in certain organs of agents apparently similar to if not identical with the agents present in the milk. The principal aim of the foster-nursing work now is to determine the nature of the agent in milk which controls the breast-cancer incidence in mice.

Mammary tumors have been obtained in mice following the long-continued oral administration of the artificial estrogen, stilbestrol.

Skin cancer.—Research on the modifying action of mouse fat and fractions thereof on the production of skin tumors has shown that only the fraction containing free fatty acids increases the number of skin tumors induced by 3,4-benzpyrene in C57 black mice.

Attempts to demonstrate photodynamic action as a factor in skin-tumor formation yielded negative results. Parallel to these studies, experiments on photodynamic action were carried out with red blood cells, leading to a clarification of the photodynamic mechanism. It was found that the number of quanta required for hemolysis was the same regardless of the intensity of the radiation, of the concentration of the sensitizer, and of whether erythrosine or rose bengal was used. The conclusion was reached that photodynamic action is an oxidation of cell constituents by molecular oxygen in which the dye acts as the light absorber without being changed throughout the reaction. Incidentally, it was discovered that certain human skins can be photosensitized by sulfanilamide therapy.

A comprehensive study of skin tumor causation was undertaken including (1) the measurement of radiation intensity at geographically representative points distributed over the country, for correlation with epidemiological findings, (2) skin-cancer production in animals by radiation under accurately defined and controlled conditions, (3)

observations of radiation response on skin-tumor patients and norms of different complexions.

Gastrointestinal cancer.—Adenocarcinoma of the small intestine was produced in strain A mice which received, instead of drinking water, olive-oil emulsions containing 1,2,5,6-dibenzanthracene or 20-methylcholanthrene. These tumors are transplantable in the same strain of mice. The same animals were used for a study of the fate of these carcinogens in the body by means of absorption spectrum analysis. Dibenzanthracene was found unchanged in the gastrointestinal canal down to the ileocecal junction. None was found in the large intestine and the feces, or in the body fluids and other tissues. However, lung tumors were induced, suggesting absorption of the carcinogen from the intestinal tract.

Injection of a methylcholanthrene solution in mineral oil into the anterior wall of the stomach of strain A mice induced squamous papilloma and squamous-cell carcinoma of the stomach.

The experimental production of these malignant gastrointestinal tumors offers an excellent opportunity for detailed study of their histogenesis and other features.

In view of the possible practical importance of the subject, a comprehensive study has been undertaken with particular reference to the chemical changes induced by heating edible fats and attempts to produce malignant gastric tumors.

Gastroscopic studies were made on 194 patients at the New York Hospital for the purpose of improving the early diagnosis of gastric cancer. In three of these cases diagnosis was made by gastroscopy only. In all instances to date gastroscopic examination has proved accurate in determining the resectability of cancer of the stomach.

Liver tumors.—Previous investigations revealed that different strains of mice varied considerably in their susceptibility to spontaneous and induced liver tumors. Work has been in progress to ascertain whether this susceptibility has a genetic basis.

A comparison was made of the growth *in vitro* of liver tissue from normal embryonic, normal young, and adult rats and liver tumors induced by amino azotoluene. Growth was excellent with embryonic tissue and declined with the increasing age of the donor animal. With tumor tissue a great increase in growth occurred, as compared with normal adult liver tissue.

Retardation of body growth was observed in young rats ingesting butter yellow in a basal diet relatively low in protein. The addition of cystine or methionine to this diet caused a prompt stimulation of growth. This and other observations indicate that the inhibition of growth is due to the production of a specific deficiency in sulfur-containing amino acids which may be necessary for detoxication of the dye. Similar experiments with a diet low in lysine suggest that cystine can detoxify the dye only if other essential amino acids are available for tissue protein synthesis. The relation of diet to liver-tumor production is under study. A diet containing a high percentage of wheat-germ oil has not caused tumors, but did cause fatty infiltration and cirrhosis.

Leukosis and Hodgkin's disease.—Leukoses were induced in C₃H and Buffalo mice, but not in CBA and C albino mice by painting them twice weekly with methylcholanthrene. Therefore, susceptibility of an inbred strain of mice to induced leukosis (contrary to the experience

with other types of tumors) does not parallel the susceptibility of the strain to spontaneous leukoses.

In continuing the study of Hodgkin's disease, 38 specimens of lymphadenomata were collected for bacteriological examination and injection of triturated tissue into experimental animals of different species. Of these specimens 5 were classified microscopically as Hodgkin's disease, 8 as lymphosarcoma, and 5 as either giant follicular cytoma or reticulum cell sarcoma. None of the inoculated animals exhibited significant abnormalities. An effort was made to determine the effect of toxic extracts of bacteria or benzene on lymph nodes of mice, guinea pigs, and rats without producing significant results.

Miscellaneous tumors.—A clinical and pathological correlation of carcinoma of the extrahepatic bile ducts was made, based on 6 new cases and 98 cases satisfactorily reported in the literature. There was an ultimate mortality of 98 percent in the surgically treated cases. A clinical and pathological study of carcinoma of the Eustachian tube was made in which it was pointed out that for correct diagnosis direct inspection of the Eustachian tube is essential.

Squamous- or adenosquamous-cell carcinoma, spindle-cell sarcoma, rhabdomyosarcoma, or mixed tumors were produced by injection of dibenzanthracene or methylcholanthrene into the salivary glands of strain A or C₃H mice.

Concerning the production of brain tumors by methylcholanthrene pellets in mice it was found that the early changes in the brain tissue are considerably less pronounced than those around similar pellets in the subcutaneous tissue.

At Duke Hospital collaboration was continued in a systematic study of the action of purified cottontail-rabbit-papilloma virus with reference to quantitative relations between purified papilloma virus and the virus-neutralizing capacity of immune serums. This work is of interest in connection with the production of carcinoma in domestic rabbits inoculated with this virus.

Mode of action of cancer-producing agents.—Systematic studies have been made of the action of two of the most powerful carcinogenic agents (methylcholanthrene and gamma rays of radium) on small free-living organisms. These were: *Eberthella typhi*, *Saccharomyces cerevisiae*, *Paramecium multimicronucleatum* and *Stenotoma*. These experiments revealed the following: (1) Immediate exposure of *E. typhi* and *P. multimicronucleatum* to methylcholanthrene results in a marked stimulation of the rate of cell division; (2) long exposure of the actively growing *P. multimicronucleatum* to gamma rays of radium elicited a definite increase in motility which persisted many days after the removal of the rays; (3) long exposure of the same species to methylcholanthrene resulted in an increased viability (toughening) of the individual organisms.

Various materials of biological origin or interest were studied as to their retarding or promoting action of tumor production with border-line doses of benzpyrene dissolved in tricaprylin. The fraction of lard liquid at 38° C. gave, with benzpyrene, far more tumors than the fraction not filterable at this temperature.

Subcutaneous tumors were induced by border-line doses of benzpyrene in a higher percentage in male than in female mice, indicating a sex factor in chemical carcinogenesis.

Synthetic carcinogens.—The previous project, in which more than 200 compounds were examined for tumor-producing potency in mice, was brought to a close. The following 1,2-dibenzanthracene derivatives caused tumors (20 mice used for each compound): 10-methyl-1:2:5:6-dibenzanthracene; 15-hydroxy-20-methylcholanthrene; 15-keto-20-methylcholanthrene; 5-aldehyde-3:4-benzpyrene; 5-methyl-3:4-benzpyrene; 5-CONH₂-10-methyl-1:2-benzanthracene; 4,9-dimethyl-1:2-benzanthracene; 10-aldehyde-1:2-benzanthracene.

Large quantities of carcinogenic hydrocarbons were synthesized because the commercial supply was inadequate.

A new project was organized in which compounds more closely related to biologically occurring substances than derivatives of benzanthracene, benzpyrene, and methylcholanthracene were to be prepared and examined for potency. Chemists of the following institutions are collaborating: Ohio State University, United States Department of Agriculture, University of Michigan, and Northwestern University.

A review of carcinogenic compounds is nearly ready for publication. Data on about 700 chemicals reported in 2,000 papers are included in this survey which extends to January 1940.

Biochemical characteristics of cancerous tissue.—The preparation and purification of the proteolytic enzyme, cathepsin, from tumors and normal tissues was continued by means of various methods. When hemoglobin was used as substrate, the liver, spleen, and kidney enzymes were more active than the tumor enzymes. With normal liver or tumor globulin as substrate, the latter was digested more readily. The enzyme preparations exhibit only limited dipeptidase activity, contain no phosphorus, and from 12 to 14 percent of nitrogen.

Work with d(−) glutamic acid failed to confirm the basic conclusions of other investigators that cancerous tissue is characterized by the presence of this acid in its proteins, since it was found that not only cancerous but also normal tissues yield a small amount of the unnatural glutamic acid upon acid hydrolysis. Furthermore, it was shown that pure l(+) glutamic acid, when submitted to hot hydrochloric acid under the same conditions as when tissues are hydrolyzed, is racemized to the extent of about 2 to 4 percent. This, therefore, seems to account for the presence of d(−) glutamic acid in the hydrolysates of normal and cancerous tissues.

Improved methods were developed for the isolation of nucleoproteins and nucleic acid from normal and cancerous tissues for the purpose of characterization of these important cell components. Nucleoprotein from the normal liver of various animal species revealed no evident differences in the proportion of amino acids with the sole exception of the ratio cysteine: cystine. Nucleic acid appears to be attached to the protein component by primary linkages. Solutions of nucleic acid possess structural viscosity and intense double refraction of flow, properties which are modified by salts. The heaviest particles from malignant tissues attained by ultracentrifugation gave absorption spectrograms indicating the presence of nucleic acid and protein.

A simple fluorometric method was developed for the quantitative estimation of riboflavin in tissues. Primary liver tumors induced by butter yellow were shown to contain much less riboflavin than normal

liver tissue. Transplanted hepatomas gave very low values. This riboflavin deficiency may explain the defective oxidation of sugar by tumor tissue.

A research fellow working at the University of Rochester School of Medicine found by the use of radioactive phosphorus that tumor phospholipids resemble liver phospholipids rather than muscle phospholipids in their turnover. The lecithin fraction of tumor phospholipids showed a more rapid uptake of radioactive phosphorus than the cephalin fraction, indicating that the tumor lecithin is metabolic, and the cephalin more structural in nature.

Preliminary studies on tracing of other chemical reactions in biological systems were carried out in collaboration with the Carnegie Institution of Washington.

Construction of a mass spectograph for a similar use of nonradioactive isotopes is in progress.

Work has also been under way in the setting up of a Tiselius apparatus, an instrument for a wide range of fluorescent analysis and Raman spectra, and the equipment of the ultracentrifuge with supplementary equipment for optical analysis of materials.

An ultraviolet microscope was installed, which will be used for the study of the reactions of normal and cancer cells to monochromatic ultraviolet light.

Continuing the fundamental investigation of the chemistry of cell division, it was found that the initiation of fission of adult amebae can be hastened by dilute solutions of reduced glutathione or cystine.

Therapeutic studies.—A 200-kv. X-ray machine was installed and is being used for studies on radiation treatment of tumors in animals, as well as for fundamental research on the mechanism of biological X-ray effects. The double X-ray-tube type provides for very high intensities for certain fundamental studies, and each tube may also be used independently, furnishing a wide range of working conditions.

More than 500 liters of *Bacillus prodigiosus* filtrate was manufactured, concentrated by chemical methods, and tested in mice for inducing hemorrhage in sarcomas of mice.

A preliminary survey was made of radiological clinics in order to secure data as to the radiation intensity to which the personnel working in those clinics is exposed. The results indicate that conditions in some of these clinics do not conform with the accepted maximum tolerated intensity of 0.1 r. per day. These studies are now being extended to all clinics that have received loans of radium from the National Cancer Institute.

Epidemiological studies.—Four thousand cancer patients have been interviewed concerning occupational, racial, medical, social, familial, and environmental background, with a view to determining the extent to which certain factors may be related etiologically to cancer. For studies on cancer mortality and results of cancer therapy see the report of the Division of Public Health Methods.

Clinical research.—The Tumor Clinic at the Marine Hospital, Baltimore, Md., is now in operation and ready for the initiation of clinical cancer research.

STATE CANCER CONTROL, RADIUM LOANS, TRAINEES, EDUCATION

Consultation service was provided on cancer control to members of State health departments and State medical society cancer committees. The following States began programs during the year: Illinois, Iowa, Louisiana, Michigan, New Jersey, Oklahoma, and Texas. Washington, Colorado, Georgia, Massachusetts, New York, Pennsylvania, and South Carolina expanded their programs.

Radium loans.—Loans of radium for use in the study and treatment of cancer were made to 47 hospitals in 24 States and the Territory of Hawaii. Approximately 945 patients had been treated with the Government-owned radium by July 1, 1940.

Trainees.—Thirty-one trainees in the diagnosis and treatment of cancer were in training for all or part of the year. Only 5 new appointments were made as 26 persons were already in training on July 1. Sixteen persons who completed their first year of study during this fiscal year were reappointed for a second year.

Education.—An educational moving-picture film, produced in cooperation with the American Society for the Control of Cancer, was made available for use by lay organizations. The educational folder on cancer prepared last year has been given wide distribution and a large quantity of other literature has been sent out in response to individual requests.

COOPERATIVE STUDIES

Cooperative studies with universities and other institutions for research projects are carried on after they have been approved by consultants who are specialists in such fields. Projects which have received aid during the fiscal year 1940 include tuberculosis control among Indians and Negroes, diphtheria immunization, pertussis vaccine study, cytology of leprosy, medical and biological studies of the Eskimo, action of larvicides in mosquito control, malaria prophylaxis research, and physiology of artificial fever.

LIBRARY

The library of the National Institute of Health had a total circulation of 14,466 books and periodicals. This figure includes 10,744 books and periodicals circulated within the Institute; 399 to other libraries and individual borrowers; and 3,323 books and journals borrowed from other libraries for the use of Institute personnel.

Five hundred and seventy-eight volumes were added during the year, making a total of 21,304 volumes in the library.

PUBLICATIONS

During the past year, 9 Public Health Bulletins and 2 National Institute of Health Bulletins were completed.

Scientific papers were prepared for Service or outside publication as follows: Articles for Public Health Reports, 142; for other Service publication, 33; articles for outside journals or society meetings, 286; papers reviewed for other Divisions of the Public Health Service or other agencies, 57.

DIVISION OF FOREIGN AND INSULAR QUARANTINE AND IMMIGRATION

Assistant Surgeon General C. L. WILLIAMS in charge

The only cases of quarantinable disease to reach ports in the United States or its possessions during the year were two cases of smallpox, one of which arrived at Honolulu and the other at New Orleans. Cholera has remained prevalent, although materially reduced, in a number of Chinese cities and ports, and spread during the year to French Indochina. Various outbreaks of disease in the interior of China were reported, but on the whole the quarantine menace from the Far East has not been greater than in 1939. Reports of an epidemic of malignant disease in southwest China were investigated by a commission, which discovered that the disease was malaria, accompanied by occasional but restricted outbreaks of bubonic plague.

No cases of suspicious disease were seen among aircraft passengers from Hongkong and the Philippines either at Honolulu or San Francisco. A careful search of airplanes at Honolulu revealed only one live mosquito during the year.

Studies reported in South America during the year made it clear that yellow fever, as jungle fever, is spread over practically all of the continent north of 30° south latitude. The seaport cities, however, have remained free of the disease, and in consequence the quarantine problem has not greatly increased, although air travel both throughout South America and from South America to the United States is rapidly developing. Measures to prevent the introduction of yellow fever have been successful. Two or three suspicious cases of illness among aircraft passengers have been discovered through the surveillance system maintained, but in no instance was the case yellow fever. Live mosquitoes on aircraft from South America have been very rare. During the year spraying of planes from the east coast of South America was initiated on the water at Port-of-Spain, Trinidad, using an air-pressure sprayer and a heavy dosage. Since this measure was put into effect, no live mosquitoes have been found in these planes on arrival at San Juan, P. R. Personnel have been trained throughout the year in the control of *Aedes aegypti*, and surveys and demonstrations have been carried out at Charleston, S. C., and Brownsville, Tex., where terminals for air travel are located. A considerable number of physicians and sanitarians in the State of Texas were vaccinated against yellow fever. The supply of yellow-fever vaccine in the United States has been curtailed to a point where it is recommended that steps be taken to insure an adequate reserve at all times.

Typhus fever continues to be prevalent in northern Africa but has not shown any unusual increase in other parts of the world. No cases have appeared on ships at United States ports.

Military operations in Europe have not up to the present produced any apparent material increase in the quarantinable diseases.

The progressive spread of rat-borne typhus fever in the southern States has focused attention on the possibilities of the spread of this disease through rats on coastwise ships. To prevent such an occurrence, active steps were inaugurated for the eradication of rats on

coastwise shipping. The operators of coastwise shipping have co-operated fully.

New construction has consisted of the completion of two additional junior officers' quarters, one combination storage, shop, and parrot-detention building, and a boat landing at Miami, Fla.

A new quarantine station for Philadelphia has been authorized and funds allocated, but to date a suitable site has not been secured. A new quarantine station at Galveston is about to be constructed.

Two 40-foot Diesel boarding boats were added to the floating equipment to replace boats that had become unserviceable.

Largely due to unsettled conditions in Europe, the volume of applications for immigration visas remained at a relatively reduced level.

Because of present disturbed world conditions and possibilities of the spread of epidemic diseases resulting therefrom, it is recommended that no reduction of present quarantine facilities be made, and no relaxation of quarantine procedures should be considered.

TRANSACTIONS AT MARITIME QUARANTINE STATIONS

TABLE 1.—*Summary of transactions at maritime stations for the fiscal year 1940*

Station	Vessels in-spected	Vessels granted free pratique	Vessels fumigated		Deratization exemption certificates issued	Passengers in-spected	Crew in-spected	Bills of health and port sanitary statements issued	Amount of bills rendered for quarantine services
			Cyanide	Sulphur					
Aberdeen, Wash.....	9	8	0	0	0	0	351	464	\$100.00
Astoria, Oreg.....	16	13	0	0	0	0	553	1,700	220.00
Baltimore, Md.....	749	676	22	0	361	660	24,470	8,323	12,955.19
Boca Grande, Fla.....	12	11	0	0	0	2	269	-----	110.00
Boston, Mass. ¹	719	626	54	0	84	15,460	39,438	2,752	12,849.52
Brunswick, Ga.....	1	1	0	0	0	4	38	94	10.00
Carrabelle (St. Georges Sound), Fla.....	4	4	0	0	0	0	44	0	20.00
Charleston S. C.....	232	206	4	0	10	725	9,024	292	2,837.03
Corpus Christi, Tex. ²	190	190	0	0	11	2	7,263	804	2,590.00
Eastport, Maine.....	4	4	0	0	0	0	77	0	40.00
Eureka, Calif.....	5	5	0	0	0	0	198	22	50.00
Fall River, Mass.....	2	2	0	0	1	0	77	10	35.00
Fernandina (Cumberland Sound), Fla.....	2	1	0	0	0	0	47	21	15.00
Fort Lauderdale (Port Everglades), Fla.....	16	16	0	0	0	7	530	0	290.00
Fort Monroe, Va.....	631	517	55	2	116	4,365	38,815	2,773	10,283.64
Freeport, Tex.....	6	6	0	0	0	0	267	0	60.00
Galveston, Tex.....	777	731	19	0	151	439	29,389	5,730	10,892.26
Georgetown, S. C.....	9	7	0	0	0	9	264	20	95.00
Gulfport, Miss.....	13	10	0	0	0	24	391	48	130.00
Jacksonville (St. Johns River), Fla.....	277	261	3	0	23	80	5,629	756	2,385.00
Key West, Fla.....	43	36	0	0	6	27	1,916	43	220.00
Los Angeles, Calif.....	1,411	1,310	34	0	233	16,542	65,024	7,349	20,838.65
Marshfield (Coos Bay), Oreg.....	5	5	0	0	0	0	168	0	50.00
Miami, Fla.....	80	73	2	0	25	2,189	4,372	665	1,079.00
Mobile, Ala.....	402	302	8	0	73	278	10,751	2,966	4,585.38
New Bedford, Mass.....	2	1	1	0	0	24	19	6	30.72
New London, Conn.....	10	10	1	0	0	9	245	26	202.92
New Orleans, La.....	1,181	1,014	25	0	210	10,126	46,700	5,876	17,421.50
Newport, R. I.....	6	6	0	0	0	21	186	0	45.00
New York, N. Y. ³	3,431	1,719	83	0	652	311,489	358,186	16,917	42,342.58
Ogdensburg, N. Y.....	0	0	0	0	0	0	0	0	0
Panama City (St. Andrews Bay), Fla.....	15	15	0	0	0	0	462	283	170.00
Pensacola, Fla.....	54	45	0	0	9	37	2,815	344	535.00
Philadelphia (Marcus Hook), Pa.....	818	679	40	0	185	1,028	29,533	4,620	13,740.98
Port Isabel (Brownsville), Tex.....	5	5	0	0	0	0	207	28	90.00

¹ Includes Plymouth, Mass.

² Includes Ingleside and Port Aransas, Tex.

³ Includes Perth Amboy, N. J.

TABLE 1.—Summary of transactions at maritime stations for the fiscal year 1940—
Continued

Station	Vessels in- spected	Vessels granted free pratique	Vessels fumi- gated		Derati- zation exemption certifi- cates issued	Passen- gers in- spected	Crew in- spected	Bills of health and port sanitary state- ments issued	Amount of bills rendered for quar- antine services
			Cya- nide	Sul- phur					
Portland, Maine.....	79	78	0	0	3	171	2,660	72	\$783.00
Portland, Oreg.....	56	54	13	0	34	241	2,519	2,776	1,922.50
Providence, R. I.....	25	23	0	0	0	3	861	61	485.88
Sabine, Tex.....	331	317	2	0	56	100	11,493	0	3,740.75
San Diego (Point Loma), Calif.....	273	215	3	0	122	330	4,954	869	3,522.86
San Francisco (Angel Is- land), Calif.....	448	350	13	0	124	13,408	27,893	0	8,035.74
San Luis Obispo (Port San Luis), Calif.....	34	34	0	0	11	1	1,399	0	815.00
Savannah, Ga.....	111	88	2	0	22	76	3,299	284	1,786.60
Searsport, Maine.....	6	6	0	0	0	0	138	0	60.00
Seattle, Wash. ⁴	79	78	12	0	33	44	3,043	4,447	1,968.56
South Bend, Wash.....	7	7	0	0	0	2	281	59	80.00
Tampa, Fla.....	201	176	7	0	33	325	3,495	1,349	1,829.38
Vineyard Haven, Mass.....	0	0	0	0	0	0	0	0	0
West Palm Beach, Fla.....	3	3	0	0	0	0	36	314	20.00
Wilmington (Cape Fear), N. C.....	45	35	1	0	2	8	1,312	42	714.50
Total.....	12,835	9,979	404	2	2,590	378,256	741,101	73,205	183,084.14
Alaska:									
Ketchikan.....	0	0	0	0	0	0	0	0	0
Wrangell.....	0	0	0	0	0	0	0	0	0
Hawaii:									
Ahukini.....	0	0	0	0	0	0	0	62	0
Hilo.....	9	7	0	0	0	0	252	214	80.00
Honolulu.....	199	186	6	0	10	29,528	36,903	1,029	4,102.00
Kahului.....	1	1	0	0	0	0	41	184	15.00
Lahaina.....	0	0	0	0	0	0	0	46	0
Mahukona.....	0	0	0	0	0	0	0	47	0
Port Allen.....	1	1	0	0	0	0	36	95	10.00
Total.....	210	195	6	0	10	29,528	37,232	1,677	4,207.00
Philippine Islands:									
Aparri.....	10	0	0	0	0	0	359	8	0
Cavite.....	26	26	0	0	0	72	3,681	7	0
Cebu.....	112	0	1	110	3	471	5,450	485	0
Davao.....	83	0	0	0	0	710	4,309	105	0
Iloilo.....	84	1	0	38	1	227	3,877	212	0
Jolo-Sulo.....	29	1	0	0	0	366	1,043	25	0
Jose Panganiban.....	121	0	0	0	0	0	5,338	136	0
Legaspi.....	62	0	0	0	0	5	2,426	64	0
Manila.....	1,048	248	184	92	1	72,001	39,448	1,253	0
Olongapo.....	7	7	0	0	0	0	667	1	0
Zamboanga.....	49	0	0	54	1	119	2,025	88	0
Total.....	1,631	283	185	294	6	73,971	128,623	2,384	0
Puerto Rico:									
Aguadilla.....	2	2	0	0	0	0	38	90	15.00
Arecibo.....	1	1	0	0	0	12	50	20	15.00
Arroyo.....	3	3	0	0	0	0	65	43	20.00
Central Aguirre.....	2	2	0	0	0	25	118	67	30.00
Fajardo.....	0	0	0	0	0	0	0	185	0
Guánica.....	32	32	0	0	1	213	956	65	250.00
Humacao.....	4	3	0	0	0	1	138	51	30.00
Mayaguez.....	28	27	0	0	1	4	1,112	264	220.00
Ponce.....	63	63	0	0	4	19	1,010	407	355.00
San Juan.....	253	241	7	0	27	1,921	4,196	796	2,515.35
Total.....	388	374	7	0	33	2,195	7,683	1,988	3,450.35
Virgin Islands:									
Charlotte Amalie.....	499	236	2	0	18	5,102	18,366	523	5,962.80
Christiansted.....	10	8	0	0	0	1	60	274	50.00
Frederiksted.....	34	34	0	0	0	104	295	280	385.00
Total.....	543	278	2	0	18	5,207	18,721	877	6,397.80
Total, all stations....	15,607	11,109	604	296	2,657	489,157	933,360	80,131	197,139.29

⁴ Includes all ports on Puget Sound.

TABLE 2.—Statement of quarantine services rendered at maritime quarantine stations during the fiscal year 1940

Station	Inspection services	Detention services	Special services	Fumigation services	Total charges
Aberdeen, Wash.	\$90	0	\$10.00	0	\$100.00
Astoria, Oreg.	220	0	0	0	220.00
Baltimore, Md.	7,885	0	3,600.00	\$1,470.19	12,955.19
Boca Grande, Fla.	100	0	10.00	0	110.00
Boston, Mass. ¹	8,046	0	805.00	3,998.52	12,849.52
Brunswick, Ga.	10	0	0	0	10.00
Carrabelle, Fla. (St. Georges Sound)	20	0	0	0	20.00
Charleston, S. C.	2,502	0	105.00	230.03	2,837.03
Corpus Christi, Tex. ²	2,590	0	0	0	2,590.00
Eastport, Maine	40	0	0	0	40.00
Eureka, Calif.	50	0	0	0	50.00
Fall River, Mass.	25	0	10.00	0	35.00
Fernandina, Fla. (Cumberland Sound)	15	0	0	0	15.00
Fort Lauderdale, Fla. (Port Everglades)	240	0	50.00	0	290.00
Fort Monroe, Va.	5,730	0	1,452.15	3,101.49	10,283.64
Freeport, Tex.	60	0	0	0	60.00
Galveston, Tex.	8,150	0	1,440.00	1,302.26	10,892.26
Georgetown, S. C.	95	0	0	0	95.00
Gulfport, Miss.	130	0	0	0	130.00
Jacksonville, Fla. (St. Johns River)	2,155	0	230.00	0	2,385.00
Key West, Fla.	190	0	30.00	0	220.00
Los Angeles, Calif.	15,860	0	2,345.00	2,633.65	20,838.65
Marshfield, Oreg. (Coos Bay)	50	0	0	0	50.00
Miami, Fla.	829	0	250.00	0	1,079.00
Mobile, Ala.	3,740	0	655.00	190.38	4,585.38
New Bedford, Mass.	15	0	0	15.72	30.72
New London, Conn.	75	0	0	127.92	202.92
New Orleans, La.	13,006	\$66	2,342.25	2,007.25	17,421.50
Newport, R. I.	45	0	0	0	45.00
New York, N. Y. ³	29,614	0	6,535.00	6,193.58	42,342.58
Ogdensburg, N. Y.	0	0	0	0	0
Panama City, Fla. (St. Andrews Bay)	170	0	0	0	170.00
Pensacola, Fla.	460	0	75.00	0	535.00
Philadelphia, Pa. (Marcus Hook)	9,255	0	1,850.00	2,635.98	13,740.98
Port Isabel, Tex. (Brownsville)	80	0	10.00	0	90.00
Portland, Maine	783	0	0	0	783.00
Portland, Oreg.	605	0	380.00	937.50	1,922.50
Providence, R. I.	295	0	20.00	170.88	485.88
Sabine, Tex.	3,085	0	560.00	95.75	3,740.75
San Diego, Calif. (Point Loma)	2,025	0	1,220.00	277.86	3,522.86
San Francisco, Calif. (Angel Island)	5,974	0	1,240.00	821.74	8,035.74
San Luis Obispo, Calif. (Port San Luis)	685	0	130.00	0	815.00
Savannah, Ga.	1,233	0	226.75	326.85	1,786.60
Searsport, Maine	60	0	0	0	60.00
Seattle, Wash. ⁴	760	0	330.00	878.56	1,968.56
South Bend, Wash.	80	0	0	0	80.00
Tampa, Fla.	1,385	0	350.00	94.38	1,829.38
Vineyard Haven, Mass.	0	0	0	0	0
West Palm Beach, Fla.	20	0	0	0	20.00
Wilmington, N. C. (Cape Fear)	605	0	30.00	79.50	714.50
Total	129,137	66	26,291.15	27,589.99	183,084.14
Alaska:					
Ketchikan	0	0	0	0	0
Wrangell	0	0	0	0	0
Total	0	0	0	0	0
Hawaii:					
Ahukini	0	0	0	0	0
Hilo	80	0	0	0	80.00
Honolulu	3,782	210	110.00	0	4,102.00
Kahului	15	0	0	0	15.00
Lahaina	0	0	0	0	0
Mahukona	0	0	0	0	0
Port Allen	10	0	0	0	10.00
Total	3,887	210	110.00	0	4,207.00

¹ Includes Plymouth, Mass.² Includes Port Aransas, Tex.³ Includes Perth Amboy, N. J.⁴ Includes all ports on Puget Sound.

TABLE 2.—*Statement of quarantine services rendered at maritime quarantine stations during the fiscal year 1940—Continued*

Station	Inspection services	Detention services	Special services	Fumigation services	Total charges
Puerto Rico:					
Aguadilla.....	\$15	0	0	0	\$15.00
Arecibo.....	15	0	0	0	15.00
Arroyo.....	20	0	0	0	20.00
Central Aguirre.....	30	0	0	0	30.00
Fajardo.....	0	0	0	0	0
Guanica.....	245	0	0	\$5.00	250.00
Humacao.....	30	0	0	0	30.00
Mayaguez.....	220	0	0	0	220.00
Ponce.....	355	0	0	0	355.00
San Juan.....	2,355	0	\$130.00	30.35	2,515.35
Total.....	3,285	0	130.00	35.35	3,450.35
Virgin Islands:					
Charlotte Amalie.....	5,800	0	120.00	42.80	5,962.80
Christiansted.....	50	0	0	0	50.00
Frederiksted.....	385	0	0	0	385.00
Total.....	6,235	0	120.00	42.80	6,397.80
Total, all stations.....	\$142,544	\$276	\$26,651.15	\$27,668.14	\$197,139.29

MEXICAN BORDER STATIONS

TABLE 3.—*Summary of quarantine transactions on the Mexican border for the fiscal year 1940*

Station	Number of persons from interior of Mexico inspected	Number of local persons inspected	Total number of persons inspected	Total number of persons disinfested	Total number of persons passed without treatment	Total number of persons vaccinated	Total number of sick refused admission	Total pieces of baggage disinfested
Brownsville, Tex.....	12,775	863,664	876,439	0	874,560	1,879	0	0
Calexico, Calif.....	0	7,163	7,163	0	6,223	940	0	0
Columbus, N. Mex.....	928	178	1,106	0	783	323	0	0
Del Rio, Tex.....	1,216	105,686	106,902	6	106,062	829	5	0
Douglas, Ariz.....	109	381	490	0	441	22	27	0
Eagle Pass, Tex.....	13,478	554,424	567,902	0	566,671	1,214	17	15
El Paso, Tex. ¹	13,228	6,977,071	6,990,299	0	6,987,176	3,123	0	0
Hidalgo, Tex.....	14,259	414,685	428,944	0	426,064	2,880	0	0
Laredo, Tex. ²	164,112	2,192,316	2,356,428	0	2,344,883	11,545	0	0
Naco, Ariz.....	6	2,787	2,793	0	2,607	186	0	0
Nogales, Ariz.....	5,446	5,097	10,543	252	9,900	391	0	0
Presidio, Tex.....	1,429	79,223	80,652	0	79,548	1,104	0	119
Rio Grande City, Tex.....	253	7,481	7,734	0	7,683	51	0	0
Roma, Tex.....	565	62,701	63,266	0	63,190	76	0	10
San Ysidro, Calif.....	2,443	4,526	6,969	0	6,367	602	0	0
Thayer (Mercedes), Tex.....	49	57,760	57,809	3	57,568	238	0	0
Zapata, Tex.....	0	15,356	15,356	0	15,261	95	0	0
Total.....	230,296	11,350,499	11,580,795	261	11,554,987	25,498	49	144

¹Includes Fort Hancock, Guadalupe Gate, and Ysleta.²Includes Minera and San Ignacio.

TRANSACTIONS AT UNITED STATES AIRPORTS OF ENTRY FOR AIRPLANES FROM FOREIGN PORTS

TABLE 4.—Summary of transactions at continental and insular stations for the fiscal year 1940

Location	Name of airport	Distance in miles to nearest Public Health Service station	Date designated	Number of airplanes arriving from foreign ports	Number of airplanes inspected by Public Health Service	Number of persons arriving from foreign ports or places	Number of persons inspected by Public Health Service	Number of aliens inspected by Public Health Service	Number of aliens certified for disease
Ajo, Ariz.	Municipal Airport ²	6	Nov. 15, 1929	0	0	0	0	0	0
Akron, Ohio ¹	Municipal Airport ²		Apr. 8, 1929	53	53	1,464	1,464	113	0
Alameda, Calif.	Alameda Seaplane Base ³								
Albany, N. Y.	Municipal Field	10	Sept. 28, 1928	19	19	499	499	81	0
Baltimore, Md.	Baltimore Airport ³	20	June 26, 1936						
Bangor, Maine	Bangor Municipal Airport ²		Apr. 18, 1931						
Bellingham, Wash.	Bellingham Airport ²		Jan. 8, 1930	535	535	6,633	6,633	1,315	0
Brownsville, Tex.	Municipal Airport	5	June 10, 1929						3
	Municipal Airport		July 23, 1933	166	0	386	0	0	0
Buffalo, N. Y.	Buffalo Marine Airport ²		June 29, 1934						
Burlington, Vt. ¹	Burlington Municipal Airport ²		Jan. 10, 1933	0	0	0	0	0	0
Calexico, Calif.	Calexico Municipal Airport ²		Apr. 23, 1934	0	0	0	0	0	0
Cape Vincent, N. Y.	Cape Vincent Harbor ²		Oct. 31, 1932						
Caribou, Maine ¹	Caribou Municipal Airport								
Charleston, S. C. ⁴	Municipal Airport								
Charlotte Amalie, V. I.	Charlotte Amalie Airport ³		Sept. 23, 1932	2	2	44	44	5	0
Cleveland, Ohio	Cleveland Municipal Airport		June 19, 1931	54	54	531	531	0	0
	Detroit Municipal Airport	5	Aug. 1, 1929	0	0	0	0	0	0
Detroit, Mich.	Wayne County Airport	15	Feb. 10, 1931	83	0	242	0	0	0
Douglas, Ariz.	Douglas Airport		Jan. 8, 1930	0	0	0	0	0	0
Duluth, Minn.	Duluth Municipal Airport		Sept. 4, 1931	0	0	0	0	0	0
	Duluth Boat Club Seaplane Base								
Eagle Pass, Tex.	Eagle Pass Airport	1½	Mar. 5, 1930	0	0	0	0	0	0
El Paso, Tex.	Municipal Airport	9	Aug. 23, 1932	8	8	20	20	18	0
Fairbanks, Alaska ¹	Weeks Municipal Airfield		Apr. 1, 1935	5	5	75	75	9	1
Fort Monroe, Va. ¹	U. S. Naval Base		July 6, 1938						
Fort Yukon, Alaska	Fort Yukon Airfield ²		June 2, 1930	176	176	2,459	2,459	0	0
Glendale, Calif.	Grand Central Air Terminal ³	12	do.	0	0	0	0	0	0
Great Falls, Mont. ¹	Great Falls Municipal Airport ²		June 18, 1930	51	51	1,105	1,105	42	1
Havre, Mont.	Havre Municipal Airport ²		do.	0	0	0	0	0	0
Honolulu, T. H.	Honolulu Airport ³		do.	0	0	0	0	0	0
Juneau, Alaska	Juneau Airport	8	June 18, 1930	0	0	0	0	0	0
Ketchikan, Alaska	Ketchikan Airport		Dec. 20, 1927	0	0	0	0	0	0
Key West, Fla.	Key West Field	4	Jan. 24, 1930	7	7	29	29	0	0
Laredo, Tex.	Laredo Airfield	3½	Apr. 18, 1930	6	0	11	0	0	0
Malone, N. Y.	Malone Airport ²								

¹ No medical officer of Public Health Service on duty.² Temporary permission.³ Authorized for use but not officially designated.⁴ Authorized ports of entry icebound.

CANAL ZONE

TABLE 5.—*Quarantine activities of the Government of the Canal Zone during the fiscal year 1940*¹

Activities	Number
Vessels inspected and passed.....	6,292
Vessels granted pratique by radio.....	129
Total.....	6,421
Crew passed at quarantine.....	319,217
Crew passed by radio.....	25,460
Passengers passed at quarantine.....	109,847
Passengers passed by radio.....	1,949
Total.....	456,473
Airplanes inspected and passed.....	729
Crew of airplanes inspected and passed.....	3,090
Passengers of airplanes inspected and passed.....	6,517
Total.....	9,607
Vessels detained in quarantine.....	1,281
Crew detained on board ship for quarantine.....	35,670
Immigration cases admitted to station.....	176
Number of detention days.....	1,864
Persons held for investigation and released.....	4,053
Persons deported under immigration laws.....	46
Supplementary inspection of vessels.....	148
Vessels fumigated.....	149
Box cars fumigated.....	
Number of "Special demand" night boardings.....	

¹ Surg. G. J. Van Beeck, U. S. Public Health Service, detailed as chief quarantine officer.

MEDICAL INSPECTION OF ALIENS

TABLE 6.—*Alien passengers and seamen inspected and certified at maritime ports in the United States and possessions during the fiscal year 1940*

Place	Number of alien passengers examined	Alien passengers certified ¹					Number of alien seamen examined	Alien seamen certified ¹				
		Class A		Class B	Class C	Total		Class A		Class B	Class C	Total
		I	II					I	II			
ATLANTIC COAST												
Baltimore, Md.....	281	0	0	1	0	1	17,496	0	27	23	5	55
Boston, Mass. ²	3,638	5	7	499	125	636	34,248	4	95	25	3	127
Brunswick, Ga.....	3	0	0	0	0	0	39	0	0	0	0	0
Charleston, S. C.....	30	0	0	0	0	0	4,432	0	13	0	0	13
Fall River, Mass.....	0	0	0	0	0	0	40	0	0	0	0	0
Fernandina, Fla. (Cumberland Sound).....	0	0	0	0	0	0	7	0	0	0	0	0
Fort Lauderdale, Fla. (Port Everglades).....	7	0	0	0	0	0	461	3	0	0	0	3
Fort Monroe, Va. ³	88	0	1	1	0	2	18,060	0	45	46	0	91
Fort Pierce, Fla.....	0	0	0	0	0	0	0	0	0	0	0	0
Georgetown, S. C.....	3	0	0	0	0	0	57	0	0	0	0	0
Gloucester, Mass.....	0	0	0	0	0	0	603	2	0	0	0	2
Jacksonville, Fla.....	33	0	0	0	0	0	4,780	0	5	0	0	5
Key West, Fla.....	1,542	0	0	30	0	30	419	1	0	0	0	1
Miami, Fla.....	20,569	5	8	258	2	273	5,367	3	7	3	0	13
New Bedford, Mass.....	16	0	0	0	0	0	9	0	0	1	2	3
New London, Conn.....	0	0	0	0	0	0	0	0	0	0	0	0
Newport, R. I.....	0	0	0	0	0	0	20	0	0	0	0	0
New York, N. Y. (Ellis Island).....	119,214	26	42	11,452	53	11,573	237,230	2	284	5	29	320
Perth Amboy, N. J.....	10	0	0	0	0	0	1,741	0	3	0	0	3
Philadelphia, Pa. ⁴	174	0	0	0	0	0	21,243	88	0	0	12	100
Portland, Maine.....	43	0	0	0	0	0	2,335	0	2	3	0	5
Providence, R. I.....	26	0	0	0	0	0	713	0	3	0	1	4
Savannah, Ga.....	63	0	0	0	0	0	2,479	17	0	0	0	17
Searsport, Maine.....	0	0	0	0	0	0	138	0	0	0	0	0
Vineyard Haven, Mass.....	0	0	0	0	0	0	0	0	0	0	0	0

¹ Class A-I: Aliens certified for idiocy, imbecility, feeble-mindedness, insanity, epilepsy, chronic alcoholism. Class A-II: Aliens certified for tuberculosis or other loathsome or dangerous contagious disease. Class B: Aliens certified for diseases or defects which affect ability to earn a living. Class C: Aliens certified for diseases or defects of less degree.

² Includes Plymouth, Mass.³ Includes Norfolk, Va., and Newport News, Va.⁴ Includes Gloucester, N. J., Lewes, Del., Marcus Hook, Pa.

TABLE 6.—*Alien passengers and seamen inspected and certified at maritime ports in the United States and possessions during the fiscal year 1940—Continued*

Place	Number of alien passengers examined	Alien passengers certified					Number of alien seamen examined	Alien seamen certified				
		Class A		Class B	Class C	Total		Class A		Class B	Class C	Total
		I	II					I	II			
ATLANTIC COAST—continued												
Washington, N. C.	0	0	0	0	0	0	0	0	0	0	0	0
West Palm Beach, Fla.	55	0	0	0	0	0	456	0	0	0	0	0
Wilmington, N. C.	8	0	0	0	0	0	980	0	0	0	0	0
Total.	145, 803	36	58	12, 241	180	12, 515	353, 353	120	484	106	52	762
GULF COAST												
Atchafalaya, La.												
Boca Grande, Fla.	0	0	0	0	0	0	59	0	0	0	0	0
Brownsville, Tex.	0	0	0	0	0	0	202	0	1	0	0	1
Carrabelle, Fla.	0	0	0	0	0	0	44	0	0	0	0	0
Corpus Christi, Tex.	2	0	0	0	0	0	5, 595	0	0	0	0	0
Freeport, Tex.	0	0	0	0	0	0	266	0	0	0	0	0
Galveston, Tex.	53	0	0	2	0	2	20, 099	2	60	1	1	64
Gulfport, Miss.	0	0	0	0	0	0	351	0	0	0	0	0
Mobile, Ala.	59	0	0	0	0	0	7, 474	38	0	2	0	40
New Orleans, La.	1, 753	0	3	14	0	17	26, 681	2	64	4	0	70
Panama City, Fla. (St. Andrews Bay)	0	0	0	0	0	0	462	1	0	0	0	1
Pascagoula, Miss.												
Pensacola, Fla.	12	0	0	0	0	0	1, 320	0	5	0	0	5
Port Aransas, Tex.	0	0	0	0	0	0	347	0	0	0	0	0
Port St. Joe, Fla.	0	0	0	0	0	0	0	0	0	0	0	0
Sabine, Tex.	38	0	0	0	0	0	9, 900	0	45	0	3	48
Tampa, Fla.	156	0	0	0	0	0	2, 457	0	2	1	0	3
Total.	2, 073	0	3	16	0	19	75, 257	43	177	8	4	232
PACIFIC COAST												
Aberdeen, Wash.	0	0	0	0	0	0	351	0	1	0	0	1
Astoria, Oreg.	2	0	0	0	0	0	553	0	1	1	0	2
Eureka, Calif.	0	0	0	0	0	0	0	0	0	0	0	0
Fort Bragg, Calif.	0	0	0	0	0	0	0	0	0	0	0	0
Los Angeles, Calif. (Terminal Island)	6, 865	1	2	39	2	44	51, 571	2	106	1	0	109
Marshfield, Oreg. (Coos Bay)	2	0	0	0	0	0	168	0	4	0	0	4
Monterey, Calif.												
Portland, Oreg.	96	0	0	1	1	2	2, 181	0	23	1	0	24
San Diego, Calif.	246	3	12	4	0	19	2, 544	0	4	1	0	5
San Francisco, Calif. (Angel Island)	4, 743	1	3	100	3	107	14, 555	0	38	1	0	39
San Luis Obispo, Calif.	1	0	0	0	0	0	1, 310	0	1	0	0	1
Santa Barbara, Calif.	0	0	0	0	0	0	0	0	0	0	0	0
Seattle, Wash.	2, 057	2	0	12	5	19	11, 026	0	14	0	0	14
South Bend, Wash.	2	0	0	0	0	0	281	0	0	0	0	0
Total.	14, 014	7	17	156	11	191	84, 540	2	192	5	0	199
INSULAR												
Alaska:												
Ketchikan	0	0	0	0	0	0	0	0	0	0	0	0
Hawaii:												
Honolulu	3, 149	1	10	19	2	32	21, 852	0	7	8	0	15
Philippine Islands:												
Aparri	0	0	0	0	0	0	0	0	0	0	0	0
Davao	45	0	0	0	0	0	0	0	0	0	0	0
Iloilo	1	0	0	0	0	0	0	0	0	0	0	0
Jolo	121	0	0	0	0	0	0	0	0	0	0	0
Legaspi	0	0	0	0	0	0	0	0	0	0	0	0
Manila	12, 440	4	60	34	6	104	26	0	0	0	0	0
Zamboanga	0	0	0	0	0	0	0	0	0	0	0	0
Total.	12, 607	4	60	34	6	104	26	0	0	0	0	0
Puerto Rico:												
Aguadilla	0	0	0	0	0	0	2	0	0	0	0	0
Arecibo	0	0	0	0	0	0	1	0	0	0	0	0
Arroyo	0	0	0	0	0	0	54	0	0	0	0	0
Central Aguirre (Jobos)	9	0	0	0	0	0	9	0	0	0	0	0
Fajardo	2	0	0	0	0	0	4	0	0	0	0	0
Guanica	66	0	0	0	0	0	304	0	1	0	0	1
Humacao	0	0	0	0	0	0	94	0	0	0	0	0
Mayaguez	0	0	0	0	0	0	221	0	0	0	0	0
Ponce	1	0	0	0	0	0	414	0	1	0	1	2
San Juan	2, 189	0	0	9	0	9	4, 623	0	12	1	0	13
Total.	2, 267	0	0	9	0	9	5, 726	0	14	1	1	16
Total, all stations.	179, 913	48	148	12, 475	199	12, 870	540, 754	165	874	128	57	1, 224

* Includes all ports on Puget Sound.

TABLE 7.—*Aliens inspected and certified at international border stations during the fiscal year 1940*

Place	Number of persons making permanent entry examined	Number of persons making temporary entry examined	Other persons examined	Total number of persons examined	Aliens certified				
					Total	Class A		Class B	Class C
						I	II		
MEXICAN BORDER									
Ajo, Ariz.....	0	0	81	81	0	0	0	0	0
Brownsville, Tex.....	260	420	928	1,608	64	5	17	27	15
Calexico, Calif.....	251	109	7,093	7,453	62	1	3	58	0
Columbus, N. Mex.....	0	0	1,106	1,106	0	0	0	0	0
Del Rio, Tex.....	9	0	27	36	5	0	3	2	0
Douglas, Ariz.....	40	5	455	500	48	5	16	17	10
Eagle Pass, Tex.....	174	12	13,397	13,583	36	7	3	16	10
El Paso, Tex. ¹	527	3,359	7,151	11,037	668	62	209	394	3
Hidalgo, Tex.....	98	0	367	465	73	5	3	32	33
Laredo, Tex.....	1,399	1,784	63,176	66,359	219	8	20	191	0
Naco, Ariz.....	8	0	2,787	2,795	182	12	40	62	68
Nogales, Ariz.....	280	1,077	4,889	6,246	332	7	63	230	32
Presidio, Tex.....	38	53	792	883	48	5	2	28	13
Rio Grande City, Tex.....	0	0	90	90	1	1	0	0	0
Roma, Tex.....	2	0	0	2	0	0	0	0	0
San Ysidro, Calif.....	540	847	5,592	6,979	130	6	14	110	0
Thayer (Mercedes), Tex.....	0	0	180	180	35	0	3	9	23
Tucson, Ariz.....	0	0	164	164	54	9	32	11	2
Zapata, Tex.....	0	134	4	138	0	0	0	0	0
Total.....	3,626	7,800	108,279	119,705	1,957	133	428	1,187	209
CANADIAN BORDER									
Bellingham, Wash.....	0	0	0	0	0	0	0	0	0
Blaine, Wash.....	296	0	889	1,185	162	16	5	43	98
Buffalo, N. Y.....	348	854	20	1,222	226	22	1	203	0
Calais, Maine.....	338	0	0	338	14	2	2	10	0
Chicago, Ill.....	0	0	221	221	5	2	1	2	0
Detroit, Mich.....	1,977	1,060	427	3,464	335	54	26	255	0
Duluth, Minn.....	1	12	547	560	0	0	0	0	0
Eastport, Idaho.....	205	84	456	745	99	7	0	57	35
Eastport, Maine.....	0	0	0	0	0	0	0	0	0
Erie, Pa.....	0	0	0	0	0	0	0	0	0
Halifax, N. S., Canada.....	541	181	17	739	258	1	3	99	155
Havre, Mont.....	0	0	3	3	0	0	0	0	0
Houlton, Maine.....	88	0	8	96	4	3	0	1	0
International Falls, Minn.....	47	4,329	305,832	310,208	43	4	0	34	5
Jackman, Maine.....	0	5	16	21	8	5	0	3	0
Malone, N. Y.....	6	4	15	25	12	5	1	0	6
Montreal, Canada.....	1,958	0	0	1,958	259	40	0	210	9
Newport, Vt.....	143	0	276	419	139	7	1	6	125
Niagara Falls, N. Y.....	422	1,097	114	1,633	219	71	1	147	0
Noyes, Minn.....	0	0	181	181	41	23	3	15	0
Ogdensburg, N. Y.....	11	10	0	21	14	0	1	6	7
Oroville, Wash.....	0	0	222	222	0	0	0	0	0
Pembina, N. Dak.....	0	0	0	0	0	0	0	0	0
Portal, N. Dak.....	0	0	0	0	0	0	0	0	0
Port Angeles, Wash.....	0	0	0	0	0	0	0	0	0
Port Huron, Mich.....	290	281	877	1,448	129	22	1	106	0
Quebec, Canada.....	791	2,934	276	4,001	366	1	0	272	93
Rochester, N. Y.....	0	0	0	0	0	0	0	0	0
Rouses Point, N. Y.....	38	0	91	129	28	9	0	17	2
St. Albans, Vt.....	94	1	73	128	24	8	0	14	2
St. John, N. B., Canada.....	293	139	13	445	53	4	0	19	30
Sault Ste. Marie, Mich.....	1	1	0	2	2	2	0	0	0
Scobey, Mont.....	0	0	0	0	0	0	0	0	0
Sumas, Wash.....	15	24	28	67	17	4	1	12	0
Sweetgrass, Mont.....	32	0	83	115	12	2	3	2	5
Van Buren, Maine.....	24	0	0	24	0	0	0	0	0
Vanceboro, Maine.....	274	0	1,008	1,282	0	0	0	0	0
Vancouver, B. C., Canada.....	0	685	0	685	121	12	2	107	0
Victoria, B. C., Canada.....	202	107	0	309	79	3	3	29	44
Winnipeg, Man., Canada.....	1,700	116	3,999	5,815	1,285	9	2	1,140	134
Yarmouth, N. S., Canada.....	33	0	36	69	12	0	0	12	0
Total.....	10,168	11,924	315,688	337,780	3,966	338	57	2,821	750
Total, all stations.....	13,794	19,724	423,967	457,485	5,923	471	485	4,008	959

¹ Includes Fort Hancock, Guadalupe Gate, and Ysleta.

TABLE 8.—*Alien seamen inspected and certified at international border stations during fiscal year 1940*

Place	Number of alien seamen examined	Alien seamen certified				
		Class A		Class B	Class C	Total
		I	II			
Buffalo, N. Y.....	4,256	0	0	10	0	10
Chicago, Ill.....	1,075	0	2	16	11	29
Cleveland, Ohio.....	773	0	1	0	2	3
Detroit, Mich.....	80	0	0	0	0	0
Duluth, Minn.....	54	0	0	0	0	0
Eastport, Maine.....	94	0	0	0	0	0
Erie, Pa.....	954	0	0	0	0	0
Ogdensburg, N. Y.....	183	0	0	0	0	0
Port Angeles, Calif.....	35	0	0	0	0	0
Port Huron, Mich.....	113	1	0	4	0	5
Rochester, N. Y.....	3,061	0	0	0	0	0
St. John, New Brunswick, Canada.....	6	0	0	0	0	0
Sault Ste. Marie, Mich.....	51	0	0	0	0	0
Total.....	10,735	1	3	30	13	47

TABLE 9.—*Distribution, according to class, of applicants for immigration visas who were medically examined during the fiscal year 1940*

Country and consular office	Total number of applicants examined	Number of applicants in each class		
		Quota	Nonquota	Nonimmi- grants
WESTERN HEMISPHERE				
Cuba: Habana.....	4, 182	3, 305	877	0
Canada, total.....	15, 268	4, 624	10, 303	341
Montreal.....	5, 634	2, 228	3, 375	31
Niagara Falls.....	639	156	482	1
Quebec.....	442	0	442	0
Toronto.....	1, 589	480	1, 109	0
Vancouver.....	1, 472	502	970	0
Windsor.....	3, 782	888	2, 894	0
Winnipeg.....	1, 531	352	870	309
Yarmouth.....	179	18	161	0
All countries, Western Hemisphere.....	19, 450	7, 929	11, 180	341
EASTERN HEMISPHERE				
Europe, total.....	44, 770	40, 846	3, 910	14
Belgium: Antwerp ¹	2, 989	2, 926	63	0
Bohemia: Prague ²	1, 227	1, 008	219	0
Denmark: Copenhagen ³	290	261	29	0
England: London.....	11, 312	10, 814	497	1
Germany, total.....	17, 473	17, 058	415	0
Berlin.....	2, 837	2, 705	132	0
Hamburg.....	1, 007	932	75	0
Stuttgart ²	6, 290	6, 147	143	0
Vienna ²	7, 339	7, 274	65	0
Holland: Rotterdam ¹	3, 410	3, 342	68	0
Ireland, Northern: Belfast.....	79	58	21	0
Irish Free State: Dublin.....	725	633	79	13
Italy: Naples ²	4, 978	2, 763	2, 215	0
Norway: Oslo ³	455	355	100	0
Poland: Warsaw ⁴	698	619	79	0
Scotland: Glasgow.....	360	317	43	0
Sweden, total.....	774	692	82	0
Goteborg ¹	333	290	43	0
Stockholm ¹	441	402	39	0
Philippine Islands, Manila.....	222	117	105	0
All countries, Eastern Hemisphere.....	44, 992	40, 963	4, 015	14

¹ Reports received for only 10 months owing to war conditions.² Reports received for only 11 months owing to war conditions.³ Reports received for only 9 months owing to war conditions.⁴ Reports received for only 3 months owing to war conditions.

DIVISION OF SANITARY REPORTS AND STATISTICS

Assistant Surgeon General CHARLES V. AKIN in charge

During the fiscal year, the Division of Sanitary Reports and Statistics continued to act as a clearing house for information relative to outbreaks and current prevalence of diseases in the United States and in foreign countries; to publish technical, scientific, and general information in the interest of better public health; and to expand those functions through such educational media as radio, graphics, news releases, and motion pictures.

The broadening functions of the Division necessitated the creation of the position of a medical officer to assist the Chief of the Division.

Effective with the first issue of Public Health Reports for 1940, the release of the reports of the current prevalence of disease was advanced to permit publication one week earlier, and the reports have been supplemented by a brief summary. Presentation of the monthly reports of the world prevalence of quarantinable diseases was simplified, thus effecting a substantial economy as well as increasing the usefulness of the reports.

MORBIDITY AND MORTALITY REPORTS

UNITED STATES

At the close of the fiscal year more than 4,500 collaborating and assistant collaborating epidemiologists were on duty in the various States, serving at a nominal salary. Through this cooperative arrangement the Public Health Service is continually receiving weekly, monthly, annual, or special reports as the situation requires, showing the morbidity trends throughout the Nation. The accompanying tables show the numbers of reported cases of the principal notifiable diseases and recorded deaths from these causes for 1937, 1938, and 1939.

TABLE 1.—*Number of cases of certain communicable diseases and cases per 100,000 population in large groups of States in the United States during 1937, 1938, and 1939*

Disease	Number of States ¹	Aggregate population (in thousands)			Cases ²			Cases per 100,000 population		
		1937	1938	1939	1937	1938	1939	1937	1938	1939
Chickenpox.....	47	128, 747	129, 703	130, 159	280, 542	286, 596	258, 486	217. 9	221. 0	198. 6
Diphtheria.....	47	128, 747	129, 703	130, 159	28, 523	30, 495	24, 045	22. 2	23. 5	18. 5
Influenza.....	47	128, 747	129, 703	130, 159	---	---	---	---	---	---
Malaria.....	47	128, 747	129, 703	130, 159	---	---	---	---	---	---
Measles.....	47	128, 747	129, 703	130, 159	319, 365	821, 462	403, 037	248. 1	633. 3	309. 6
Meningitis, meningococcus...	44	126, 254	127, 188	127, 663	5, 473	2, 903	1, 965	4. 3	2. 3	1. 5
Mumps.....	42	105, 094	105, 905	106, 052	152, 112	152, 315	129, 717	144. 7	143. 8	122. 3
Pellagra.....	47	128, 747	129, 703	130, 159	---	---	---	---	---	---
Pneumonia (all forms).....	47	128, 747	129, 703	130, 159	---	---	---	---	---	---
Poliomyelitis.....	47	128, 747	129, 703	130, 159	9, 486	1, 702	7, 339	7. 4	1. 3	5. 6
Scarlet fever.....	47	128, 747	129, 703	130, 159	228, 413	189, 181	162, 735	177. 4	145. 9	125. 0
Smallpox.....	47	128, 747	129, 703	130, 159	11, 673	14, 939	9, 877	9. 1	11. 5	7. 6
Tuberculosis (all forms).....	47	128, 747	129, 703	130, 159	---	---	---	---	---	---
Tuberculosis (respiratory system).....	43	125, 870	126, 799	127, 204	---	---	---	---	---	---
Typhoid and paratyphoid fever.....	47	128, 747	129, 703	130, 159	16, 021	14, 889	13, 055	12. 4	11. 5	10. 0
Whooping cough.....	47	128, 747	129, 703	130, 159	214, 309	227, 168	183, 046	166. 5	175. 1	140. 6

¹ In addition to the number of States given, the District of Columbia is also included.

² Cases, case rates, and case fatality rates are omitted for those diseases for which some States reported more deaths than cases.

TABLE 2.—Number of deaths and deaths per 100,000 population from certain communicable diseases, with number of cases reported for each death registered in large groups of States in the United States during 1937, 1938, and 1939

Disease	Deaths			Deaths per 100,000 population			Cases reported for each death registered		
	1937	1938	1939	1937	1938	1939	1937	1938	1939
Chickenpox	116	104	110	0.1	0.1	0.1	2,418	2,756	2,350
Diphtheria	2,610	2,556	2,022	2.0	2.0	1.6	11	12	12
Influenza	39,033	16,712	21,834	30.3	12.9	16.8			
Malaria	2,700	2,307	1,750	2.1	1.8	1.3			
Measles	1,392	3,223	1,171	1.1	2.5	.9	229	255	344
Meningitis, meningococcus	2,151	1,057	692	1.7	.9	.5	3	3	3
Mumps	56	56	73	.1	.1	.1	2,716	2,720	1,777
Pellagra	3,160	3,176	2,442	2.5	2.4	1.9			
Pneumonia (all forms)	109,630	87,484	77,602	85.2	67.4	59.6			
Polioomyelitis	1,432	478	756	1.1	.4	.6	7	4	10
Scarlet fever	1,759	1,211	855	1.4	.9	.7	130	156	190
Smallpox	30	46	39	(1)	(1)	(1)	389	325	253
Tuberculosis (all forms)	68,722	63,007	61,319	53.4	48.6	47.1			
Tuberculosis (respiratory system)	61,078	55,895	54,505	48.5	44.1	42.8			
Typhoid and paratyphoid fever	2,690	2,392	1,997	2.1	1.8	1.5	6	6	7
Whooping cough	4,913	4,716	3,008	3.8	3.6	2.3	44	48	61

¹ Less than 0.1 per 100,000 population.

Provisional information from the Bureau of the Census and from Public Health Service records indicates a death rate approximately the same as that for 1938, 10.6 per 1,000 estimated population. The mortality trend according to the Bureau of the Census records for the registration area of the United States is shown in the accompanying table for the years 1900-1939.

TABLE 3.—Death rate (number per 1,000 population) for registration area, by years, 1900-1939

Year	Rate	Year	Rate	Year	Rate	Year	Rate
1939 ¹	10.7	1929	11.9	1919	12.9	1909	14.4
1938	10.6	1928	12.1	1918	18.1	1908	14.8
1937	11.2	1927	11.4	1917	14.3	1907	16.0
1936	11.5	1926	12.3	1916	14.0	1906	15.7
1935	10.9	1925	11.8	1915	13.6	1905	16.0
1934	11.0	1924	11.7	1914	13.6	1904	16.5
1933	10.7	1923	12.2	1913	14.1	1903	16.0
1932	10.9	1922	11.7	1912	13.9	1902	15.9
1931	11.1	1921	11.6	1911	14.2	1901	16.5
1930	11.3	1920	13.0	1910	15.0	1900	17.6

¹ Provisional.

The decline in the infant mortality rate from 51.0 for 1938 to 48.0 for 1939 and a decrease in the maternal mortality of 10 percent are new records which should renew the courage and increase the efforts of those devoted to the cause of better health.

The outstanding items of interest in public health statistics are discussed more fully in the foreword of this report.

FOREIGN COUNTRIES

The accompanying table indicates the countries in which quarantinable diseases were most prevalent during the calendar year 1939.

TABLE 4.—*Number of cases and deaths from cholera, plague, smallpox, typhus fever, and yellow fever reported in certain countries during 1939*¹

Country	Cases	Deaths	Country	Cases	Deaths
Cholera			Plague		
India.....	139, 293	70, 109	India.....	38, 078	20, 718
China.....	2, 054	946	Uganda.....	314	299
Iran.....	613	307	Ecuador.....	79	-----
Afghanistan.....	543	809	Thailand.....	77	31
India (French).....	111	68	Brazil.....	67	7
Thailand.....	24	10	Belgian Congo.....	66	62
India (Portuguese).....	15	15	Bolivia.....	21	-----
Ceylon.....	9	-----	Indochina (French).....	6	5
Smallpox			Typhus fever		
India.....	129, 615	30, 134	Tunisia.....	6, 212	-----
United States.....	9, 877	39	Egypt.....	4, 294	784
Belgian Congo.....	6, 731	298	Poland.....	² 3, 176	160
India (French).....	4, 336	821	United States.....	2, 996	143
Nigeria.....	3, 159	529	Algeria.....	2, 038	-----
Colombia.....	2, 772	75	Chile.....	1, 505	268
Mexico.....	1, 602	-----	Chosen.....	1, 306	146
Portugal.....	1, 369	105	Mexico.....	1, 152	-----
China.....	1, 351	625	Morocco.....	1, 112	-----
Chosen.....	618	177	Union of South Africa.....	1, 028	223
Yellow fever			Yellow fever		
Brazil.....	-----	128	French Equatorial Africa.....	4	4
Ivory Coast.....	20	11	Niger Territory.....	3	-----
Senegal.....	17	-----	Gold Coast.....	2	2
Colombia.....	-----	11	Cameroons (French).....	1	1
Nigeria.....	9	2	Togo (French).....	1	-----

¹ Leaders indicate that figures are not available.² January to July, inclusive.

PUBLICATIONS

The Public Health Reports, weekly publication of the Public Health Service, had its origin on July 13, 1878, when the Marine Hospital Service, in accordance with the provisions of the National Quarantine Act of April 29, 1878, began the weekly publication of the "Bulletin of Public Health." The first number was little more than half a page in length and was reproduced by the papyrographic process. It contained reports of the occurrence of yellow fever in Cuba and on a Norwegian ship and a Spanish bark at the port of Key West, Fla., and of cholera on two British vessels conveying Indian troops to Malta. The first volume covered the period from July 13, 1878, to May 24, 1879. The second volume was issued from January 20 to December 30, 1887, under the title "Weekly Abstract of Sanitary Reports." In 1896 the name was changed to the "Public Health Reports," and it has been issued weekly under this title since that date.

The Public Health Service is directed by law to "study and investigate the diseases of man and conditions influencing the propagation and spread thereof," and to "issue information in the form of publications for the use of the public" (U. S. Code, title 42, sec. 7). It is also directed to collect morbidity and mortality statistics, which "shall be compiled and published by the Public Health Service as a part of the health reports published by said service" (U. S. Code, title 42, sec. 30).

In accordance with these laws, "Public Health Reports" serves as the medium for the publication of the results of research carried

on in the laboratories of the Public Health Service and in the field, of statistical and educational material of interest to public health workers, and of reports of the current prevalence of communicable diseases in the United States and of quarantinable and other diseases in foreign countries. By this means persons interested in preventive medicine and public health are kept informed of the many activities of the Service, and health officers and others concerned with the control of the communicable diseases are given the latest reports on disease prevalence. During the present fiscal year a number of changes were made in the presentation of the weekly and monthly morbidity reports, in order to make them more current and more useful.

During the fiscal year 1940, volume 54, part 2, and volume 55, part 1, of Public Health Reports were issued, comprising 52 numbers and containing 2,330 pages of text and tabular matter, as compared to 2,439 pages in the fiscal year 1939, and 2,156 pages in 1938. Indexes were issued during the year for parts 1 and 2 of the yearly volumes.

More than 160 articles were published during the year, covering all fields of the work of the Service. Among the outstanding contributions were: Four articles analyzing data collected in the National Health Survey; a report of the experimental transmission of poliomyelitis to the eastern cotton rat, and to the white mouse; reports on riboflavin deficiency in man and the ocular manifestations of ariboflavinosis; a study of mortality rates in rural areas as related to economic status; a report on the existence and use of hospital facilities in the several States in relation to per capita income; a study of the trends and geographical and racial distribution of heart disease mortality among young persons in the United States; and a number of articles relating to quarantine procedures.

Reprints of important articles appearing in the Public Health Reports are issued, providing for more economical distribution to persons interested in the particular subjects, and permitting the printing of additional copies for sale by the Superintendent of Documents. During the fiscal year 1940, 90 reprints were issued, as compared with 133 in 1939, and 117 in 1938. Reprinting has been restricted to articles of general or educational interest and to technical articles for which definite need was felt.

During the fiscal year, six Supplements to Public Health Reports and new editions of nine supplements previously published were issued. The supplements contain articles intended for popular distribution or special studies not suitable for publication in Public Health Reports. New editions of six reprints and two miscellaneous publications were issued. When new editions of publications became necessary, the information is revised and brought up to date. Revisions of a number of publications are in process.

"Hospital News," a multilithed collection of reports by personnel of the marine hospitals, was edited and issued semi-monthly to Public Health Service personnel. The National Negro Health Week publications, reported elsewhere, were also issued.

EDUCATIONAL AND INFORMATIONAL ACTIVITIES

The educational and informational activities of the Division comprise the preparation of written materials for the general public,

including news releases; the production and distribution of motion pictures, exhibits, and other graphic materials; the promotion of radio programs; the coordination and administration of the National Negro Health Week program; the provision of informational services to other Divisions of the Public Health Service and to outside agencies and private individuals, including editorial research; and studies relating to educational problems and materials in the health field.

WRITTEN MATERIALS

The preparation of written materials has been reported, in part, under the heading "Publications." In addition, the staff of the Division has prepared approximately 250 news releases, statements, leaflets, addresses, special articles, and pamphlets during the year. A publication entitled "Pneumonia: Some Important Facts Regarding Treatment and Control" is in press. "The Work of the Public Health Service" was rewritten and issued as a Supplement to the Public Health Reports. A pamphlet, "A Medical Career in the Public Health Service," has been prepared and is ready for publication.

Sixty new leaflets on as many health subjects have been prepared and produced by the multilith process. These leaflets replace an outmoded series previously issued for the information of the general public.

Sixty-three news releases were prepared during the year, and distributed to 550 special writers, national press correspondents, and various press associations requesting this service.

The annual organization handbook of the National Negro Health Week program, and the quarterly, "National Negro Health News," were prepared and issued.

MOTION PICTURES AND RADIO

Cancer film.—The cancer education film, "Choose to Live," was produced by the Department of Agriculture for the Public Health Service and the American Society for the Control of Cancer under the supervision of this Division. The film was released in April 1940, concurrently with the President's proclamation of April as Cancer Control Month.

The Public Health Service at the present time possesses 31 prints, 35 mm. size, and 25 prints, 16 mm. size, for distribution on a loan basis. Five 35 mm. prints and 40 of the smaller size have been turned over to the Department of Agriculture for distribution through the 23 depositories and other channels of that agency.

A large national chain of motion-picture theaters is showing "Choose to Live" in all parts of the country. Preliminary reports showed audiences totaling 250,000. Several other theater chains have requested use of the film in their houses. Through the Department of State, one print has been loaned to the Director of Public Health of Peru, for extensive showings over a period of 2 months. At the close of the fiscal year, 11 State departments of health and 5 city and county health departments had purchased copies of the film.

Radio.—In cooperation with the United States Office of Education, a series of radio broadcasts entitled "Democracy in Action" was presented. Six programs were designed to acquaint the public with

advances made in the prevention and control of disease through the years, and to increase public knowledge of both individual and community health. The program was presented over the 90-station network of the Columbia Broadcasting System in 6 Sunday broadcasts at 1 to 1:30 p. m. The titles and dates of the broadcasts were as follows:

Growing Pains.....	Nov. 12.
Border Stop Signs.....	Nov. 19.
Case History.....	Nov. 26.
If the Truth Be Known.....	Dec. 3.
A New Lease on Life.....	Dec. 10.
Partners in Prevention.....	Dec. 17.

GRAPHIC MATERIALS

Exhibits.—An exhibit was prepared for the Federal Security Agency as a whole, demonstrating how the various Bureaus within the Agency work together in attempting to preserve the traditional pattern of American life. This exhibit was designed for use on occasions requiring information on the Federal Security Agency as a whole, rather than on individual Bureaus.

A special exhibit was designed for the Health Department of the District of Columbia for showing at the large exhibition entitled "Tomorrow's Citizen" which was held at the Smithsonian Institution. The District of Columbia Health Department was responsible for the production and installation of the exhibit designed by the Service.

An exhibit on occupational leukoderma was designed and produced for Doctors Louis Schwartz and Leon H. Warren of the National Institute of Health and Doctor Edward A. Oliver of Chicago. Photographs, charts, rubber gloves, and chemicals were used to present in graphic form the methods of investigating actual cases of leukoderma caused by chemicals.

Posters.—Four posters were designed for the National Cancer Institute to be used in connection with cancer control work. These are now in press. The titles include: "Cancer early diagnosis would save 50,000 lives every year"; "Cancer from 7th to 2d place among the big killers in the last 25 years"; "Only X-ray—radium—surgery—ever cured cancer"; and "Cancer danger signals." A poster for use in connection with fly control education was also prepared and issued.

Photographs.—A total of 806 photographic prints were requested and distributed to newspapers, magazines, health organizations, public health officers, and others. The 13 new picture series added to the photographic files during the year include the cancer clinic of the Baltimore Marine Hospital; the Baltimore Quarantine Station; Negro health activities; malaria control work and research at the Columbia, S. C., and Savannah, Ga., stations; pneumonia control in the District of Columbia; the National Institute of Health; air-passenger quarantine and inspection activities at Miami, Fla.; the New Orleans, La., Quarantine Station; X-ray equipment; industrial safety; lighting; youth activities. Numerous miscellaneous photographs were added for use in connection with the production of other health education materials or for release; these include a large number of photographs for the venereal disease control program.

NEGRO HEALTH EDUCATION

The National Negro Health Week program and other educational services for Negro groups throughout the country are coordinated in the office of Negro Health Work. The activities of this office are devoted to the promotion of racial and interracial understanding of the particular health conditions of the Negro and to the stimulation of racial self-help and the provision of health facilities for Negro groups by the various health departments and health agencies. These benefits are in addition to the many other services of which the Negro is the beneficiary in the general health program of the Public Health Service and in specialized activities of the several Divisions of the Service, especially the venereal disease control program.

The emphasis of the twenty-sixth observation of the Health Week movement was upon the objective, "Cooperative Endeavor for the Attainment of Community Health." The impetus provided by the celebration of the silver anniversary of the movement in 1938, and the expanding health programs of the several States were reflected in the 1940 Health Week reports from 6,216 communities, urban and rural, in 36 States and Territories. The number of people reached by various activities was 3,500,000, of whom 2,015,615 attended meetings and conferences. A total of 9,112 lectures were given; and 790,180 individuals received instruction in health sermons at Health Week church services. Motion pictures and exhibits were viewed by 173,675 persons; 109,885 visitors inspected exhibits; 201,856 adults and children participated in health pageants, plays, and parades; 613 radio talks were broadcast.

Special clinics for the Health Week provided examinations and treatment for 142,660 men, women, and children. Clean-up activities, insect and rodent eradication, correction of unsanitary conditions, paint-up and repair improvements, and food and flower garden projects were undertaken by the families and neighbors of 161,118 homes. A total of 411,775 selected publications were distributed and 613 newspaper articles provided appropriate information for participants in community programs.

The field service of the office of Negro Health Work included 29 localities in 13 States. Lectures, motion pictures, and exhibits reached 94,465 persons in public meetings and group conferences under the auspices of 216 organizations during 119 days of field duty.

The National Negro Health News, quarterly bulletin of information on health matters especially affecting the Negro population, was issued to a subscription list of 3,500 health workers in official and voluntary health agencies, teachers, and social workers.

The health consciousness aroused during the Health Week period was maintained and directed into useful purposes by the year-round follow-up of the Health Week committees and other cooperating community groups through correspondence, occasional releases of pertinent health data and articles, and advisory services in the field.

Contacts and communications resulting from the activities of this office indicate a favorable trend toward increasing use of practical methods of health education, and toward the training of Negro physicians and nurses for public health work and their employment for service to the members of their racial group. There also is apparent

an increasing recognition of the difficulties involved in providing adequate health service from limited Federal, State, and local appropriations, and a greater appreciation on the part of professional workers and community leaders of the opportunity to ease the load of public service by consciously including hygienic living and community responsibility in their programs.

INFORMATIONAL SERVICES

At the close of the fiscal year 1939, there was established in this Division an Informational Section having for its primary purpose the collection and study of printed materials useful in the field of public health education, with special reference to pamphlet and reprint publications.

Pamphlet and reprint reference files were established and the systematic collection of such materials was begun. Effort was particularly directed toward the collection of Federal, State, and local government publications, although the available publications of non-official organizations were collected whenever they came to the attention of the section.

At the close of the fiscal year, approximately 8,500 separate items had been collected. Of these, some 3,500 are publications issued by official and nonofficial health organizations for the information of the general public.

The remaining 5,000 items are reports, pamphlets, and reprints of a more technical nature on medical subjects, public health, health education methods, and sociology and economics in relation to health problems and their solution. This large group of publications has been classified and catalogued and provides an important pool of source materials for the compilation of current reference lists on many special topics of interest to both professional and nonprofessional groups.

In November 1939, the section issued a bibliography containing 557 selected references on health and medical services in the United States and related subjects, with special reference to the National Health Conference of 1938. Approximately 600 copies of the bibliography have been distributed upon request to numerous organizations and individuals.

In March 1940, the section issued an annotated list of some 125 publications of the Public Health Service. The items were selected for adult study groups and teachers.

In addition, the section has compiled 50 or more special reading lists and a catalogue of approximately 150 health education motion-picture films available on loan or rental from certain State agencies.

The compilation of a select bibliography on public health and medical care in the United States was undertaken in the late spring of 1940. The references cited in the earlier compilation were confined to publications bearing dates more recent than 1935, and the scope of the bibliography was somewhat limited. Requests to the Public Health Service for information on source materials upon these and related subjects have indicated the need for a bibliography broader in scope and more comprehensive from the chronological standpoint. The new compilation, containing 580 references, a list of publishers

with their addresses, and a subject index, has been completed and is ready for publication.

The Informational Section has also in the course of the year reviewed 50 health and safety textbooks for high school students, 25 popular books on health subjects, and 3 health education projects proposed by the Work Projects Administration under the sponsorship of State health departments. Book manuscripts have been reviewed for the authors, and editorial research has been provided for several Divisions of the Public Health Service. Conferences have been held with individuals and with representatives of governmental and private agencies interested in health educational materials.

SPECIAL STUDIES

A study designed to obtain information on the extent to which the interrelated problems of public health, medicine, sociology, economics, and psychology are taught in liberal arts colleges of the United States has been completed. With the cooperation of the Division of Higher Education of the United States Office of Education and 230 institutions in the 48 States, data were obtained on the courses which include teaching of such subjects and which were offered during the school year 1939-40. A total of 715 courses was reported by 139 of the institutions canvassed in the study; of these, 112 courses were devoted entirely to pertinent subjects, and 603 were devoted in part to such teaching. More than one-half of the total courses were offered in approximately one-third of the institutions canvassed. Approximately 90 percent of the total courses were offered in four major departments of the institutions, namely, departments of biological sciences, physical education and hygiene, social work, and sociology.

With the cooperation of State and Territorial departments of health, city health departments, private health organizations, and certain Federal agencies, approximately 3,500 pamphlets distributed by these agencies for the information of the public have been collected.

A study of these materials has been undertaken with a view to obtaining much needed information on the following points: (1) The number of pamphlet publications available from the principal official and nonofficial health agencies for the education of the general public; (2) the subjects covered by existing materials; (3) the suitability of the content of such materials for different groups of the population; and (4) the literary quality of such materials from the point of view of the general public.

Preliminary findings of the study show a plethora of publications upon certain health subjects, and serious gaps in existing materials on other important public health problems. A notable lack of materials on pneumonia, industrial hygiene, mental hygiene of the general population, and housing and health may be mentioned. The content of a large proportion of the pamphlets is directed toward the education of parents, teachers, and other interested adults on the health problems of infants and young children.

In connection with the pamphlet study, preliminary trials have been made of a test for appraising the readability of health education materials. Results suggest the possibility of developing a standard of health writing which might be applied to the preparation of pamphlet materials by both educational and public health personnel.

LIST OF NEW PUBLICATIONS ISSUED DURING THE YEAR

REPRINT FROM THE PUBLIC HEALTH REPORTS

2059. The evolution of disseminated bacterial infection in guinea pigs. Influence of treatment with insulin and phloridzin. By Mark P. Schultz and Edythe J. Rose. April 21, 1939. 6 pages.
2060. Lymphocytic choriomeningitis. Report of two cases, with recovery of the virus from gray mice (*Mus musculus*) trapped in the two infected households. By Charles Armstrong and Lewis K. Sweet. April 28, 1939. 12 pages.
2061. Maternal mortality in rural and urban areas. By Harold F. Dorn. April 28, 1939. 8 pages.
2062. Disabling industrial morbidity, third and fourth quarters of 1938 and the entire year. By William M. Gafafer. April 28, 1939. 5 pages.
2063. The effectiveness of certain types of commercial air filters against bacteria (*B. subtilis*). By J. M. DallaValle and Alexander Hollaender. April 28, 1939. 4 pages.
2064. Aquatic life in waters polluted by acid mine waste. By James B. Lackey. May 5, 1939. 8 pages.
2065. Biological products. Establishments licensed for the propagation and sale of viruses, serums, toxins, and analogous products. May 5, 1939. 8 pages.
2066. What people ask about health. By Robert Olesen. May 12, 1939. 26 pages.
2067. Report of three cases of ariboflavinosis. By J. W. Oden, L. H. Oden, Jr., and W. H. Sebrell. May 12, 1939. 2 pages.
2068. Sylvatic plague: studies of predatory and scavenger birds in relation to its epidemiology. By William L. Jellison. May 12, 1939. 8 pages.
2069. Organized public nursing and variation of field programs in 94 selected counties. By Joseph W. Mountin and Evelyn Flook. May 19, 1939. 12 pages.
2070. Material services in Michigan with special reference to economic status. By Jennie C. Goddard and Carroll E. Palmer. May 19, 1939. 16 pages.
2071. Notes on the fleas of prairie dogs, with the description of a new subspecies. By William L. Jellison. May 19, 1939. 5 pages.
2072. Prevalence of poliomyelitis in the United States in 1938. By C. C. Dauer. May 26, 1939. 6 pages.
2073. Domestic water and dental caries, including certain epidemiological aspects of oral *L. acidophilus*. By H. Trendley Dean, Philip Jay, Francis A. Arnold, Jr., Frank J. McClure, and Elias Elvove. May 26, 1939. 27 pages.
2074. Studies of sewage purification. X. Changes in characteristics of activated sludge induced by variations in applied load. By C. C. Ruchhoft and R. S. Smith. June 2, 1939. 16 pages.
2075. A study of human sera antibodies capable of neutralizing the virus of lymphocytic choriomeningitis. By Jerald G. Wooley, Fred D. Stimpert, John F. Kessel, and Charles Armstrong. June 2, 1939. 6 pages.
2076. Acute response of guinea pigs to the inhalation of dimethyl ketone (acetone) vapor in air. By H. Specht, J. W. Miller, and P. J. Valaer. June 2, 1939. 12 pages.
2077. Analysis of 5,116 deaths reported as due to acute coronary occlusion in Philadelphia, 1933-1937. By O. F. Hedley. June 9, 1939. 41 pages.
2078. Smallpox vaccination: a comparison of vaccines and techniques. By Ralph V. Ellis and Ruth E. Boynton. June 9, 1939. 16 pages.
2079. Influence of castration on the induction of subcutaneous tumors in mice of the C₅H strain by 1:2:5:6-dibenzanthracene. By Harold L. Stewart. June 9, 1939. 6 pages.
2080. Studies on immunizing substances in pneumococci. IX. Cutaneous tests in nonimmunized and immunized individuals in relationship to serum antibody content. By Lloyd D. Felton and Perry Franklin Prather. June 16, 1939. 18 pages.
2081. Rocky Mountain spotted fever. Protective value for guinea pigs of vaccine prepared from rickettsiae cultivated in embryonic chick tissues. By Herald R. Cox. June 16, 1939. 8 pages.
2082. The preservation of lymphocytic choriomeningitis and St. Louis encephalitis viruses by freezing and drying in vacuo. By Jerald G. Wooley. June 16, 1939. 2 pages.

2083. The significance of dust counts. By J. M. DallaValle. June 23, 1939. 10 pages.
2084. Studies of the acute diarrheal diseases. II. Parasitological observations. By Bertha Kaplan Spector, A. V. Hardy, and Mary Graham Mack. June 23, 1939. 9 pages.
2085. Breast cancer in breeding and virgin "A" and "B" stock female mice and their hybrids. By John J. Bittner. June 23, 1939. 6 pages.
2086. The induction of carditis by the combined effects of hyperthyroidism and infection. By Mark P. Schultz. July 7, 1939. 24 pages; 10 plates.
2087. The incidence of cancer in Atlanta, Ga., and surrounding counties. By Joseph W. Mountin, Harold F. Dorn, and Bert R. Boone. July 14, 1939. 20 pages.
2088. Allergic irritability in rheumatic and nephritic patients. By Mark P. Schultz. July 14, 1939. 6 pages.
2089. The diagnosis of oxyuriasis. Comparative efficiency of the NIH swab examination and stool examination by brine and zinc sulfate floatation for *Enterobius vermicularis* infection. By Willi Sawitz, Vada L. Odom, and David R. Lincicome. June 30, 1939. 12 pages.
2090. Studies on the standardization of gas gangrene antitoxin (Sordellii). By Sarah E. Stewart and Ida A. Bengtson. August 4, 1939. 6 pages.
2091. Report on market-milk supplies of certain urban communities, July 1, 1937-June 30, 1939. August 11, 1939. 5 pages.
2092. Public Health Service publications. A list of publications issued during the period January-June 1939. August 11, 1939. 6 pages.
2093. Disabling morbidity among employees in the soap industry, 1930-34, inclusive. By Hugh P. Brinton and Harry E. Seifert. July 21, 1939. 16 pages.
2094. Treatment of induced malaria in Negro paretics with mapharsen and tryparsamide. By Martin D. Young and Sol B. McLendon. August 18, 1939. 4 pages.
2095. Dermatitis caused by a new insecticide. By Louis Schwartz and Leon H. Warren. August 4, 1939. 10 pages.
2096. Dental programs sponsored by health agencies in 94 selected counties. By Joseph W. Mountin and Evelyn Flook. September 8, 1939. 12 pages.
2097. The solubility of lead arsenate in body fluids. By Lawrence T. Fairhall. September 8, 1939. 8 pages.
2098. The National Health Survey. Scope and method of the Nation-wide canvass of sickness in relation to its social and economic setting. By George St. J. Perrott, Clark Tibbitts, and Rollo H. Britten. September 15, 1939. 25 pages.
2099. A procedure for putting health department reports to work. By Mayhew Derryberry and J. O. Dean. September 22, 1939. 10 pages.
2100. The experimental transmission of poliomyelitis to the eastern cotton rat *Sigmodon hispidus hispidus*. By Charles Armstrong. September 22, 1939. 4 pages.
2101. The treatment of lymphopathia venereum with sodium sulfanilyl sulfanilate and sodium sulfanilate. By Arthur Hebb, S. G. Sullivan, and Lloyd D. Felton. September 29, 1939. 20 pages.
2102. The protection of mice against *Hemophilus influenzae* (non-type-specific) with sulfapyridine. By Margaret Pittman. September 29, 1939. 6 pages.
2103. Possible relation of calcium deficiency to the utilization of vitamin B₁. Preliminary report. By L. F. Badger and E. Masunaga. September 29, 1939. 4 pages.
2104. Stabilized method of forecasting population. By Bernard D. Karpinos. October 6, 1939. 16 pages.
2105. Studies of a filter-passing infectious agent isolated from ticks. V. Further attempts to cultivate in cell-free media. Suggested classification. By Herald R. Cox. October 6, 1939. 6 pages.
2106. Cultivation of Phase I, *H. pertussis*, in a semisynthetic liquid medium. By J. W. Hornibrook. October 13, 1939. 4 pages.
2107. The influence of transplanted normal tissue on breast-cancer ratios in mice. By John J. Bittner. October 6, 1939. 5 pages.
2108. Studies in chemotherapy. X. Colorimetric tests for aromatic hydroxylamines and for further oxidation products of aromatic amines. Their demonstration in the urine following sulfanilamide administration. By Sanford M. Rosenthal and Hugo Bauer. October 20, 1939. 12 pages.

2109. Recovery of the virus of poliomyelitis from the stools of healthy contacts in an institutional outbreak. By S. D. Kramer, A. G. Gilliam, and J. G. Molner. October 27, 1939. 9 pages.
2110. Directory of State and insular health authorities, July 1, 1939. October 27, 1939. 14 pages.
2111. Disabling morbidity, and mortality among white and Negro male employees in the slaughter and meat packing industry, 1930-34, inclusive. By Hugh P. Brinton. November 3, 1939. 13 pages.
2112. Studies on oxyuriasis. XIV. Controlled tests with various methods of therapy. By Willard H. Wright, Frederick J. Brady, and John Bozicevich. November 10, 1939. 12 pages.
2113. The significance of the excretion of lead in the urine. By Lawrence T. Fairhall and R. R. Sayers. November 10, 1939. 4 pages.
2114. Riboflavin deficiency in man (ariboflavinosis). By W. H. Sebrell and R. E. Butler. December 1, 1939. 11 pages.
2115. Comparison of occupational class and physicians' estimate of economic status. By Jennie C. Goddard. December 8, 1939. 8 pages.
2116. Effect of fluorides on salivary amylase. By F. J. McClure. December 8, 1939. 6 pages.
2117. The cultivation of *Rickettsia diaporica* in tissue culture and in the tissues of developing chick embryos. By Herald R. Cox and E. John Bell. December 8, 1939. 8 pages.
2118. Relapsing fever: *Ornithodoros hermsi* a vector in Colorado. By Gordon E. Davis. December 8, 1939. 4 pages.
2119. Disabling morbidity among employees in the slaughter and meat packing industry, 1930-34, inclusive. By Hugh P. Brinton, Harry E. Seifert, and Elizabeth S. Frasier. December 15, 1939. 25 pages.
2120. *Rickettsia diaporica*: Recovery of three strains from *Dermacentor andersoni* collected in southeastern Wyoming: Their identity with Montana strain 1. By Gordon E. Davis. December 15, 1939. 9 pages.
2121. The relation between the trypanocidal and spirocheticidal activities of neoarsphenamine. V. The spirocheticidal activity of the several American brands of neoarsphenamine. By T. F. Probe. December 22, 1939. 6 pages.
2122. Hemorrhagic adrenal necrosis in rats on deficient diets. By Floyd S. Daft and W. H. Sebrell. December 22, 1939. 4 pages.
2123. Hemorrhagic cortical necrosis of adrenals in rats on deficient diets. By A. A. Nelson. December 22, 1939. 8 pages; 2 plates.
2124. Chloropicrin as a prewarning gas in ship fumigation. By G. C. Sherrard. December 29, 1939. 5 pages; 2 plates.
2125. Successful transfer of the Lansing strain of poliomyelitis virus from the cotton rat to the white mouse. By Charles Armstrong. December 29, 1939. 9 pages.
2126. Mortality rates and economic status in rural areas. By Harold F. Dorn. January 5, 1940. 9 pages.
2127. The effect of sulfapyridine and sulfanilamide with and without serum in experimental meningococcus infection. By Sara E. Branham. January 5, 1940. 14 pages.
2128. Rocky Mountain spotted fever. Treatment of infected laboratory animals with immune rabbit serum. By Norman H. Topping. January 12, 1940. 6 pages.
2129. Cases and days of illness among males and females with special reference to confinement to bed. Based on 9,000 families visited periodically for 12 months, 1928-31. By Selwyn D. Collins. January 12, 1940. 47 pages.
2130. Epidemic and endemic typhus: Protective value for guinea pigs of vaccines prepared from infected tissues of the developing chick embryo. By Herald R. Cox and E. John Bell. January 19, 1940. 6 pages.
2132. *Anopheles walkeri* (Theobald): A wild-caught specimen harboring malarial plasmodia. By F. B. Bang, G. E. Quinby, and T. W. Simpson. January 19, 1940. 2 pages; 1 plate.
2133. Report on market-milk supplies of certain urban communities. January 1, 1938-December 31, 1939. January 19, 1940. 5 pages.
2134. The disabling diseases of childhood. Their characteristics and medical care as observed in 500,000 children in 83 cities canvassed in the National Health Survey, 1935-1936. I. Characteristics and leading causes. By Dorothy F. Holland. January 26, 1940. 22 pages.

2135. Ocular manifestations of ariboflavinosis. By H. D. Kruse, V. P. Sydenstricker, W. H. Sebrell, and H. M. Cleckley. January 26, 1940. 13 pages.
2136. Community economic status and the dental problem of school children. By Henry Klein and Carroll E. Palmer. February 2, 1940. 20 pages.
2137. The disabling diseases of childhood. Their characteristics and medical care as observed in 500,000 children in 83 cities canvassed in the National Health Survey, 1935-1936. II. Medical and nursing care. By Dorothy F. Holland. February 9, 1940. 18 pages.
2138. The bacterial assay of riboflavin in the urine and tissues of normal and depleted dogs and rats. By H. F. Fraser, N. H. Topping, and H. Isbell. February 16, 1940. 10 pages.
2139. A further study of the mode of action of methylcholanthrene on normal tissue cultures. By Wilton R. Earle and Carl Voegtlin. February 23, 1940. 20 pages; 9 plates.
2140. A study of pneumococcus typing serums for the purpose of standardizing a test for potency. By Bernice E. Eddy. March 1, 1940. 15 pages; 1 plate.
2141. Yellow fever. By J. H. Bauer. March 1, 1940. 9 pages.
2142. Studies of sewage purification. XI. The removal of glucose from substrates by activated sludge. By C. C. Ruchhoft, J. F. Kachmar, and W. Allan Moore. March 8, 1940. 30 pages.
2143. The National Health Survey. Some general findings as to disease, accidents, and impairments in urban areas. By Rollo H. Britten, Selwyn D. Collins, and James S. Fitzgerald. March 15, 1940. 27 pages.
2144. Using tests as a medium for health education. By Mayhew Derryberry and Arthus Weissman. March 22, 1940. 5 pages.
2145. Siphonaptera: Notes on two California species. By Wm. L. Jellison. March 22, 1940. 4 pages.
2146. *Ornithodoros hermsi*: Feeding and molting habits in relation to the acquisition and transmission of relapsing fever spirochetes. By Gordon E. Davis and Mary E. Walker. March 22, 1940. 12 pages.
2147. Attempts to produce tumors in rats by feeding crude wheat germ oil made by prolonged ether extraction. By Harold Blumberg. March 29, 1940. 8 pages.
2148. Factors influencing carcinogenesis with methylcholanthrene. III. The effect of solvents. By Michael B. Shimkin and Howard B. Andervont. March 29, 1940. 9 pages.
2149. Studies of sewage purification. XII. Metabolism of glucose by activated sludge. By C. C. Ruchhoft, J. F. Kachmar, and O. R. Placak. April 5, 1940. 20 pages.
2151. Geographical distribution of diphtheria mortality in the United States. By C. C. Dauer. April 12, 1940. 8 pages.
2152. The incidence of cancer in Cook County, Illinois, 1937. By Harold F. Dorn. April 12, 1940. 24 pages.
2153. Tularaemia (rabbit fever). April 19, 1940. 4 pages.
2154. Effect of petroleum ether extract of mouse carcasses on skin tumor production in C57 black mice. By John J. Morton and G. Burroughs Mider. April 19, 1940. 8 pages.
2155. *Bacterium tularense*: Its persistence in the tissues of the argasid ticks *Ornithodoros turicata* and *O. parkeri*. By Gordon E. Davis. April 19, 1940. 5 pages.
2156. Ticks (*Ornithodoros* spp.) in Arizona bat "caves." By Cornelius B. Philip. April 19, 1940. 4 pages.
2158. A highly virulent strain of Rocky Mountain spotted fever virus isolated in the eastern United States. By Norman H. Topping and R. E. Dyer. April 26, 1940. 4 pages.

SUPPLEMENTS TO THE PUBLIC HEALTH REPORTS

151. The ratproofing of new ships. By P. W. Clark. 1939. 50 pages; 32 plates.
152. The work of the United States Public Health Service. 1940. 82 pages.
154. Business census of hospitals, 1935. General report. By Elliott H. Pennell, Joseph W. Mountin, and Kay Pearson. 1939. 38 pages.
155. The Kolb classification of drug addicts. By M. J. Pescor. 1939. 10 pages.
156. Diphtheria: Its prevention and control. 1939. 21 pages.

157. Laws pertaining to the admission of patients to mental hospitals throughout the United States. By Grover A. Kempf. 1939. 29 pages.
158. Studies on codeine addiction. By C. K. Himmelsbach, Howard L. Andrews, Robert H. Felix, Fred W. Oberst, and Lowrey F. Davenport. 1940. 67 pages.
160. The notifiable diseases. Prevalence in States, 1938. 1940. 13 pages.
161. Ivy and sumac poisoning. 1940. 8 pages; 2 plates.

PUBLIC HEALTH BULLETINS

247. Chronic manganese poisoning in an ore-crushing mill. By Robert H. Flinn, Paul A. Neal, Warren H. Reinhart, J. M. DallaValle, William B. Fulton, and Allan E. Dooley. 1940. 77 pages; 1 halftone.
248. Cancer mortality in the United States. I. Trend of recorded cancer mortality in the death registration States of 1900 from 1900 to 1935. By Mary Gover. 1939. 58 pages.
249. Skin hazards in American industry. Part III. By Louis Schwartz. 1939. 93 pages; 22 halftones.
251. Dental health organizations in State departments of health in the United States. By F. C. Cady. 1939. 86 pages.
252. Cancer mortality in the United States. II. Recorded cancer mortality in geographic sections of the death registration States of 1920, from 1920 to 1935. By Mary Gover. 1940. 74 pages.
253. The relative toxicity of lead and some of its common compounds. By Lawrence T. Fairhall and R. R. Sayers. With a section on pathology by J. W. Miller. 1940. 40 pages; 6 halftones; 1 lithograph.

NATIONAL INSTITUTE OF HEALTH BULLETINS

172. Fluorides in food and drinking water. A comparison of effects of water-ingested versus food-ingested sodium fluoride. By F. J. McClure. 1939. 53 pages; 27 halftones.
173. I. Leprosy: Two strains of acid-fast bacilli isolated from a case of human leprosy. A comparison with other strains of acid-fast organisms with particular reference to the Lleras bacillus. By L. F. Badger, D. W. Patrick, G. L. Fite, and Don Wolfe. II. Leprosy: The pathology of experimental rat leprosy. By G. L. Fite. III. Leprosy: Variations in the virulence of strains of rat leprosy. By L. F. Badger and G. L. Fite. 1940. 83 pages; 8 halftones.

MISCELLANEOUS PUBLICATION

30. Communicable diseases. By A. M. Stimson. 1939. 111 pages.

UNNUMBERED PUBLICATIONS

- Index to Public Health Reports, volume 54, part 1, January-June 1939. 27 pages.
- Index to Public Health Reports, volume 54, part 2, July-December 1939. 29 pages.
- What to know; what to do about cancer. Illustrated folder.
- National Health Week program. This pamphlet is published annually, usually about the middle of March, for community leaders in an effort to suggest ways and means by which interested individuals and organizations may be organized for a concerted and effective attack upon the community's disease problems. Twenty-sixth observance, March 31-April 7, 1940. 16 pages.
- National Negro Health Week poster. Twenty-sixth observance. 1940.
- National Negro Health Week leaflet. Twenty-sixth observance. 1940. 2 pages.

ANNUAL REPORT

- Annual Report of the Surgeon General of the United States Public Health Service for the fiscal year 1939. 185 pages.

DIVISION OF MARINE HOSPITALS AND RELIEF

Assistant Surgeon General R. P. SANDIDGE in charge

The Hospital Division, through the 26 marine hospitals and 126 other relief stations, continued the oldest function of the Service, namely, that of providing out-patient and hospital treatment to American merchant seamen and other legal beneficiaries. During the year 69,937 patients were furnished 2,031,593 hospital days relief, while 353,724 patients received 1,442,196 office treatments. A total of 423,661 accredited persons were thus furnished hospital and office treatment. At the close of the year, 5,378 patients were in the hospitals, including 177 insane in St. Elizabeths Hospital, Washington, D. C., 33 insane patients in State hospitals in California, and 372 patients in the National Leprosarium at Carville, La. A total of 213,778 physical examinations were performed.

The figures quoted above represent a definite increase over those of former years. In 1925, 204,944 sick and disabled patients, exclusive of those treated in connection with veterans' relief activities of the Service, were furnished relief. In 1940 the number had increased to 415,922. The number of patients treated annually from 1868 to 1940 is shown in table 1, page 127.

Additional personnel and improved facilities have become necessary in order adequately to meet and serve these increasing demands for medical and surgical relief. (For a statement of construction and improvements completed during the year and in line for completion in the immediate future, see section "New Construction," page 125.)

Adequate facilities are still lacking for the prompt and proper care of female patients seeking admission and treatment; since the benefits of the Service were extended to dependent members of families of personnel of the United States Coast Guard and the United States Coast and Geodetic Survey a problem has arisen in finding suitable space for these beneficiaries.

The increase in personnel has hardly kept pace with the increase in the demand for services but improvements are being made constantly in this direction. In substantial measure the 44-hour work week was established in all marine hospitals, funds having been provided for additional ward service and culinary employees.

Although merchant seamen continued to be the largest single class of beneficiaries treated, definite increases are noted in some of the other groups. This latter is thought to be accounted for, at least in part, by increased employment of personnel under the national defense program. The number of requests for examinations by civil service selectees has increased sharply at many stations and still further increase is anticipated.

The Public Health Service Dispensary in Washington has been active throughout the year. In addition to rendering medical care

GROUP OF HOSPITALS	HOSPITAL	ACTIVITY					COST PER IN-PATIENT DAY				
		Total number in-patients transferred to hospital	Total in-patient days	Daily average in-patient per discharged patient	*Number in-patients	Death rate in-patients	Salary allowances	Subsistence supplies	Other expenses	Gross per diem cost	Net per diem cost
GENERAL	Baltimore, Md.	5,990	154,118	421.1	28.5	36.9	\$2.59	\$0.41	\$0.88	\$3.88	\$3.54
	Boston, Mass.	2,477	59,357	167.7	13.5	17.0	3.49	.46	1.69	6.13	5.59
	Chicago, Ill.	2,932	72,313	197.6	30.2	11.6	3.46	.40	1.21	5.09	4.52
	Cleveland, Ohio	5,439	87,476	239.0	13.2	38.4	2.32	.45	1.08	4.45	3.92
	Detroit, Mich.	2,281	61,689	168.5	26.8	27.7	3.68	.59	1.10	5.37	4.60
	Ellis Island, N.Y.	2,700	128,081	349.9	5.9	15.9	2.93	.44	.99	4.42	3.92
	Frederick, Ind.	746	19,108	82.2	26.1	16.1	3.80	.36	.63	5.09	4.30
	Galveston, Tex.	2,638	57,953	156.4	16.3	16.8	2.87	.44	1.66	4.97	3.8
	Key West, Fla.	903	17,900	46.9	21.2	16.8	2.80	.92	1.66	4.98	4.56
	Kittwood, Mo.	1,510	41,859	114.4	23.9	9.9	3.50	.40	1.11	4.81	4.62
	Madison, Ky.	2,004	51,174	111.8	16.2	31.2	3.41	.41	1.33	5.42	4.80
	Memphis, Tenn.	2,009	38,038	103.9	16.2	31.2	3.41	.41	1.33	5.42	4.80
	Mobile, Ala.	2,698	54,822	149.8	14.1	12.2	2.46	.40	.89	3.75	2.97
	New Orleans, La.	5,734	156,225	426.8	28.0	26.0	2.86	.43	.93	4.22	3.57
	Norfolk, Va.	3,689	99,975	273.2	24.4	20.7	2.95	.44	.99	4.36	3.50
	Pittsburgh, Pa.	1,223	32,689	64.7	20.9	4.7	2.90	.40	3.45	6.75	6.00
	Portland, Me.	611	19,269	52.6	31.1	27.8	3.49	.41	3.54	7.44	6.97
	San Francisco, Calif.	5,121	147,094	401.8	30.6	17.1	2.86	.40	1.00	4.26	3.78
	Savannah, Ga.	1,623	37,352	137.2	10.2	29.6	2.01	.44	1.10	3.55	2.9
	Savitar, Ind.	3,038	54,377	341.3	36.7	31.2	2.70	.46	.80	3.96	3.47
	Seattle, Wash., D.C.	2,143	52,416	151.2	14.2	16.0	3.55	.44	1.08	4.77	4.10
	Steward House, Mass.	133	3,394	44.2	5.1	33.0	3.16	.56	1.16	4.68	3.71
	New York, N.Y. (a)										
	Totals or Averages	62,236	1,658,243	4,607.1	28.9	22.0	2.99	.43	1.02	4.44	3.99
Cost \$6,750,125.24											
TUBERCULOSIS SANATORIUM	Fort Stanton, N.Mex.	456	64,956	177.5	163.0	52.8	3.10	.59	2.03	5.72	4.10
Cost \$ 266,801.69											
LEPROSARIUM	Curtis, La.	429	133,659	385.7	1,351.6	65.3	2.17	.48	.85	3.50	3.11
Cost \$ 416,522.43											
ALL	Totals or Averages	63,101	1,855,026	5,150.3	30.0	22.5	2.94	.44	1.02	4.40	3.93
Cost \$7,412,519.36											

* Based on average daily load; i. e., 366 days + average number days per discharged patient.

(a) No in-patient department at this station.

In-patient activity and average per diem cost of in-patient relief at United States Marine Hospitals, fiscal year 1940.



New United States Marine Hospital, Boston, Mass., occupied June 1, 1910.

to beneficiaries of the Service, advice and assistance were given the Federal Trade Commission and the Post Office Department in the prosecution of fraud cases. Annual physical examinations were made of the uniformed forces of the Treasury Secret Service and the White House police. Examinations of Vocational Rehabilitation Service cases were continued, as were the precamp examinations of Boy Scouts.

Emergency medical relief was provided government employees in Washington by 17 first-aid units conducted by Service personnel. These units are located in various government buildings, 11 being in offices under the Treasury Department, 2 in the Department of Labor, and 1 each in buildings occupied by the Farm Credit Administration, Federal Reserve Board, Securities and Exchange Commission, and the Reconstruction Finance Corporation.

The organization of the Tumor Clinic at Baltimore, Md., has been practically completed. The clinic proper has been receiving and treating patients since November 1, 1939. During this 8-month period, 226 patients have been treated by surgery, X-ray, radium, or a combination of these, and 146 additional patients have been seen or examined in consultation. Of the 226 patients treated by the clinic, 183 were hospitalized and 43 treated as out-patients.

Sulfanilamide and sulfapyridine have been widely used during the year. At some stations sulfapyridine has almost supplanted the use of serum in the treatment of pneumonia. Cases are typed, however, early in the disease and the serum is used when indicated. Experimental studies are being made with these drugs, as well as with sulfathiazole, in an attempt properly to evaluate their usefulness in various conditions. Additional research studies include, as in the past, problems in the field of arthritis and psoriasis, and experimental studies in arsenic excretion and the physiology of histamine.

CLASSES OF BENEFICIARIES AND AMOUNT AND CHARACTER OF SERVICES RENDERED

Summary of services by class of beneficiary

Class of beneficiary	Hospital days		Out-patient treatments		Physical examinations (not related to treatment)		Remarks
	Number	Per cent of total	Number	Per cent of total	Number	Per cent of total	
American merchant seamen.	1,031,980	50.80	538,029	37.30	21,097	9.87	Communicable diseases are reported to local health officers. Patients of the Veterans' Administration.
Veterans.....	221,148	10.89	820	.06	3,155	1.47	
Patients afflicted with leprosy.	134,015	6.60	1	-----	4	-----	National Leprosarium, Carville, La.
Coast Guard personnel....	121,249	5.97	158,389	10.98	15,489	7.24	All medical services and supplies, ashore and afloat.
Coast Guard dependents...	4,775	.24	40,677	2.82	99	.05	Pay for hospital care.
Injured Federal employees.	86,034	4.23	147,084	10.20	27,163	12.71	Patients of the Employees' Compensation Commission.
Immigrants.....	38,371	1.89	8,610	.60	1,724	.81	Patients of the Bureau of Immigration.
Seamen, Engineer Corps and Army Transport Service.	42,642	2.10	22,591	1.57	3,585	1.68	Civilian employees on Army vessels.

Summary of services by class of beneficiary—Continued

Class of beneficiary	Hospital days		Out-patient treatments		Physical examinations (not related to treatment)		Remarks
	Number	Percent of total	Number	Percent of total	Number	Percent of total	
Seamen from foreign vessels.	17,364	0.85	2,294	0.16	2	-----	Pay patients.
Civilian Conservation Corps.	60,229	2.96	554	.04	4	-----	Patients of the Civilian Conservation Corps.
Work Projects Administration.	232,853	11.46	216,706	15.02	64,773	30.30	Patients of the Work Projects Administration.
Alaska cannery workers leaving United States.	-----	-----	213	.01	470	.22	Vaccinations and other preventive measures.
Pilots and other licenses.	-----	-----	-----	-----	9,426	4.41	For the Steamboat Inspection Service.
Civil Service applicants and employees.	-----	-----	-----	-----	45,873	21.46	For the Civil Service Commission.
Maritime Service.	6,309	.31	41,200	2.86	7,230	3.38	To provide training and other benefits for personnel of the U. S. Merchant Marine.
All others entitled to treatment.	34,624	1.70	265,028	18.38	13,684	6.40	From Bureau of Fisheries, Army, Navy, Coast and Geodetic Survey, Coast and Geodetic Survey dependents, etc.
Total.	2,031,593	100.00	1,442,196	100.00	213,778	100.00	

NURSING SECTION

There was an appreciable increase in nursing and other personnel under the general supervision of the Nursing Section, incident to the increase in the demands for medical services.

A course in anesthesia for Service nurses has been established at the Marine Hospital, Staten Island, N. Y. Three nurses have completed the course and have been assigned to other stations. A nurse and a dietitian are assisting the National Institute of Health in a special study of pellagra being conducted at Milledgeville, Ga.

Superintendent of Nurses Katharine S. Read is in charge of the Nursing Section.

DENTAL TREATMENT

Dental treatment was given to 110,303 beneficiaries of the Service by 54 full-time dental officers and 38 dental internes. The major items of treatment furnished at the marine hospitals and other relief stations are listed below:

Number of patients treated	110,303
X-rays	38,505
Prophylactic treatments (hours)	16,037
Vincent's stomatitis treatments (cases)	1,050
Pyorrhea treatments (cases)	4,486
Extractions	67,080
Alveolectomies	3,926
Alloy fillings	43,927
Gold inlays	1,242
Porcelain crowns	124
Silicate cement fillings	17,221
Dentures (full and partial)	7,895
Fracture cases	300
Number of treatments (out-patient)	235,357
Number of treatments (in-patient)	119,752
Total number of treatments	355,109

Dental officers were assigned to United States maritime training stations and United States Coast Guard cutters, and the two motorized dental stations continued the service to Coast Guard personnel at isolated units.

Senior Dental Surgeon N. Y. Hooper was in charge of the clinical dental activities of the Service.

UNITED STATES COAST GUARD

The number of Coast Guard beneficiaries on active duty and retired was increased from 11,566 as of June 30, 1939, to 13,787. This increase is reflected in the large number of physical examinations performed for the Coast Guard.

Year	Numerical strength of Coast Guard and medical services given				Average amount of medical services per person		
	Number of Coast Guard personnel	Hospital days	Out-patient treatments	Physical examinations	Hospital days	Out-patient treatments	Physical examinations
1936	10,748	88,325	130,206	5,149	8.2	12.1	0.5
1937	10,325	91,500	141,939	6,437	8.9	13.7	.6
1938	10,014	84,784	121,849	8,234	8.5	12.2	.8
1939	11,566	89,456	103,189	5,581	7.7	8.9	.5
1940	13,787	121,249	158,389	15,489	8.8	11.5	1.1

Twenty-five medical and dental officers were assigned to the Coast Guard and the Maritime Training Service; 105 local physicians, serving under appointments as acting assistant surgeons, furnished medical and surgical relief and conducted physical examinations of Coast Guard personnel at units remote from Public Health Service relief stations.

Medical officers were detailed to the cutters on the International Ice Patrol and the Bering Sea Patrol Force, to vessels operating in a special commission to Greenland, and to vessels on the Neutrality Patrol. Full-time medical officers served the cutters basing at San Juan, P. R., Honolulu, T. H., and Cordova and Juneau, Alaska.

Medical Director M. C. Guthrie served as representative of the Surgeon General at Coast Guard Headquarters and as chief medical officer of the Coast Guard.

NEW CONSTRUCTION

New construction and repairs completed at marine hospitals during the year include:

Baltimore, Md.—Extension and remodeling of hospital building to provide cancer research facilities.

Boston, Mass.—A new marine hospital with a bed capacity of 336, occupied June 1, 1940.

Kirkwood, Mo.—A new marine hospital with a bed capacity of 150, occupied September 16, 1939. (This hospital replaced the old marine hospital at St. Louis, Mo.)

Memphis, Tenn.—A new building to house the laundry, shops, and garage; remodeling of the surgical building, and conversion of old administrative building into officers' quarters.

New Orleans, La.—New fireproof recreation building, occupied June 1, 1940.

Staten Island, N. Y.—An extension to the hospital building, providing over 300 additional beds, new boiler house facilities, and quarters for the medical officer in charge.

Additional building programs now under way include the following:

Carville, La.—A contract, in amount of \$2,374,205, for new construction in connection with the general rehabilitation of the marine hospital has been awarded. Plans and specifications are nearing completion in the office of the Supervising Architect for the third and last step of this rehabilitation program and it is hoped that the work will be placed on the market at an early date. The remodeling and enlarging of the power plant at this station was recently completed.

Fort Stanton, N. Mex.—A contract, in amount \$197,998, covering the construction of personnel quarters, a new nurses' home, and a Catholic chapel has been awarded and the work should be completed during the year.

San Francisco, Calif.—Funds were recently obtained for the construction of a second story to the laboratory building and the erection of an additional set of officer's quarters.

Savannah, Ga.—Funds, in amount \$42,500, were appropriated for the purchase of the home now leased by the government as quarters for nurses attached to this hospital.

Many repairs and improvements of a major character were accomplished under Work Projects Administration projects, the materials having been furnished by the Public Buildings Administration.

In addition to the foregoing, considerable repairs and improvements to the buildings and grounds at nearly all of the marine hospitals were effected by station labor.

SUPPLIES AND EQUIPMENT

Supplies and equipment, valued at \$1,485,499, were approved for purchase through the Procurement Division, or purchased by the Medical Supply Section. The estimated value of supplies and equipment shipped from the Supply Station, Perry Point, Md., was \$213,599. A total of 5,866 requisitions were handled.

Supply purchase functions, with specific limitations, were resumed in the office of the Surgeon General under an authority issued on February 20, 1940, by the Director of Procurement to the Administrator of the Federal Security Agency.

FREEDMEN'S HOSPITAL

Under authority of the President's Reorganization Plan IV, Freedmen's Hospital, Washington, D. C., with all its functions, was transferred from the Department of the Interior to the Federal Security Agency, effective June 30, 1940. The hospital will be operated under the direction of the Hospital Division of the Public Health Service.



New United States Marine Hospital, Kirkwood, Mo., occupied September 16, 1939 (rear view).

CONSOLIDATED AND DETAILED REPORTS

TABLE 1.—Number of patients treated annually, 1868 to 1940¹

Fiscal year	Sick and disabled patients furnished relief	Fiscal year	Sick and disabled patients furnished relief	Fiscal year	Sick and disabled patients furnished relief
Prior to reorganization:		After reorganization—Continued.		After reorganization—Continued.	
1868.....	11, 535	1893.....	53, 317	1918.....	71, 614
1869.....	11, 356	1894.....	52, 803	1919.....	79, 863
1870.....	10, 560	1895.....	52, 643	1920.....	110, 907
After reorganization:		1896.....	53, 804	1921.....	144, 344
1871.....	14, 256	1897.....	54, 477	1922.....	153, 633
1872.....	13, 156	1898.....	52, 709	1923 ²	126, 956
1873.....	13, 529	1899.....	55, 489	1924.....	159, 686
1874.....	14, 356	1900.....	56, 355	1925.....	204, 944
1875.....	15, 009	1901.....	58, 381	1926.....	245, 140
1876.....	16, 808	1902.....	56, 310	1927.....	249, 973
1877.....	15, 175	1903.....	58, 573	1928.....	240, 592
1878.....	18, 223	1904.....	58, 556	1929.....	260, 552
1879.....	20, 922	1905.....	57, 013	1930.....	279, 350
1880.....	24, 860	1906.....	54, 363	1931.....	259, 364
1881.....	32, 613	1907.....	55, 129	1932.....	257, 208
1882.....	36, 184	1908.....	54, 301	1933.....	294, 101
1883.....	40, 195	1909.....	53, 704	1934.....	304, 439
1884.....	44, 761	1910.....	51, 443	1935.....	329, 586
1885.....	41, 714	1911.....	52, 209	1936.....	327, 245
1886.....	43, 822	1912.....	51, 078	1937.....	350, 386
1887.....	45, 314	1913.....	50, 604	1938.....	560, 973
1888.....	48, 203	1914.....	53, 226	1939.....	398, 133
1889.....	49, 518	1915.....	55, 782	1940.....	415, 922
1890.....	50, 671	1916.....	58, 357		
1891.....	52, 992	1917.....	64, 022		
1892.....	53, 610				

¹ These figures do not include patients treated in connection with veterans' relief activities of the Service, as follows: 1918, 192; 1919, 13, 856; 1920, 279,036; 1921, 667,832; 1922, 242,379; 1923, 9,704; 1924, 3,414; 1925, 4,360; 1926, 3,749; 1927, 2,830; 1928, 3,448; 1929, 4,907; 1930, 6,817; 1931, 9,278; 1932, 9,667; 1933, 8,377; 1934, 716; 1935, 2,448; 1936, 3,970; 1937, 5,424; 1938, 5,958; 1939, 7,291; and 1940, 7,739.

² In this year, and subsequently, the practice of recounting out-patients applying for treatment in more than 1 calendar month was discontinued.

TABLE 2.—Transactions at United States marine hospitals and other relief stations

Hospital or relief station	Total number of patients treated	Number of patients treated in hospitals	Died	Patients remaining in hospitals June 30, 1940	Number of days relief in hospitals	Number of patients furnished office relief	Number of times office relief was furnished	Number of physical examinations
Grand total.....	423, 661	69, 937	1, 517	5, 378	2, 031, 593	353, 724	1, 442, 196	213, 778
FIRST-CLASS STATIONS								
<i>Marine hospitals</i>								
Baltimore, Md.....	18, 063	5, 990	221	424	154, 118	12, 073	59, 101	8, 748
Boston, Mass. ¹	15, 442	2, 177	37	186	59, 557	13, 265	31, 236	11, 484
Buffalo, N. Y.....	5, 823	864	23	48	22, 162	4, 959	15, 856	4, 303
Carville, La.....	2, 711	429	28	372	133, 829	2, 282	3, 842	15
Chicago, Ill.....	15, 388	2, 932	34	184	72, 313	12, 456	33, 559	13, 732
Cleveland, Ohio.....	10, 793	3, 439	132	224	87, 476	7, 354	25, 867	10, 285
Detroit, Mich.....	7, 690	2, 381	66	174	61, 689	5, 309	24, 905	6, 886
Ellis Island, N. Y.....	8, 092	2, 700	43	338	128, 081	5, 392	10, 616	334
Evansville, Ind.....	1, 495	746	12	28	19, 108	749	1, 997	307
Fort Stanton, N. Mex.....	2, 584	436	23	163	64, 956	2, 148	5, 044	166
Galveston, Tex.....	9, 049	2, 638	58	156	57, 963	6, 411	21, 501	3, 115
Key West, Fla.....	2, 086	903	17	30	17, 900	1, 183	4, 411	293
Kirkwood, Mo. ²	5, 469	1, 510	15	125	41, 859	3, 959	17, 078	6, 054
Louisville, Ky.....	2, 831	1, 604	50	63	32, 416	1, 227	4, 963	957
Memphis, Tenn.....	4, 600	2, 009	8	105	38, 038	2, 591	9, 685	1, 894
Mobile, Ala.....	7, 550	2, 298	28	138	54, 822	5, 252	17, 603	1, 259
New Orleans, La.....	14, 932	5, 234	136	438	156, 225	9, 698	41, 460	3, 813
New York, N. Y.....	41, 303					41, 303	276, 622	40, 729

¹ Old hospital closed and new hospital opened June 1, 1940.

² St. Louis hospital closed and Kirkwood opened Sept. 16, 1939.

TABLE 2.—*Transactions at United States marine hospitals and other relief stations—Continued*

Hospital or relief station	Total number of patients treated	Number of patients treated in hospitals	Died	Patients remaining in hospitals June 30, 1940	Number of days relief in hospitals	Number of patients furnished office relief	Number of times office relief was furnished	Number of physical examinations
FIRST-CLASS STATIONS—CON								
<i>Marine hospitals—Con.</i>								
Norfolk, Va.	14, 115	3, 869	80	288	99, 975	10, 246	43, 954	3, 824
Pittsburgh, Pa.	5, 029	1, 283	6	71	23, 689	3, 746	8, 919	3, 415
Portland, Maine	2, 625	611	17	39	19, 269	2, 014	9, 745	5, 611
San Francisco, Calif.	18, 603	5, 191	89	390	147, 054	13, 412	68, 670	5, 876
Savannah, Ga.	4, 451	1, 623	48	149	57, 552	2, 828	12, 937	1, 005
Seattle, Wash.	12, 850	3, 658	114	322	124, 927	9, 192	32, 556	6, 159
Staten Island, N. Y.	19, 118	8, 443	135	539	204, 656	10, 675	42, 846	3, 849
Vineyard Haven, Mass.	309	133	2	13	5, 394	176	427	15
Contract overflow hospitals	80	80	3	35	14, 156			
Total	253, 081	63, 181	1, 425	5, 042	1, 899, 184	189, 900	825, 400	139, 128
SECOND- AND THIRD-CLASS STATIONS								
Aberdeen, Wash.	490	23	1		160	467	1, 010	114
Albany, N. Y.	130	15			195	115	153	772
Anacortes, Wash.	199	13			27	186	433	20
Apalachicola, Fla.	27					27	140	1
Ashland, Wis.	217	15	1	1	94	202	324	7
Ashtabula, Ohio.	321	20	2		194	301	812	57
Astoria, Oreg.	653	51	2	1	274	602	1, 418	139
Balboa Heights, C. Z.	1, 478	310	1	11	4, 026	1, 168	1, 247	
Bangor, Maine	29	3		1	64	26	43	94
Bath, Maine	83					83	196	2
Bay City, Mich.	137	8			91	129	284	2
Beaufort, N. C.	774	89	1		533	685	2, 833	13
Bellingham, Wash.	256	16			89	240	651	35
Biloxi, Miss.	560	10			102	550	967	27
Brunswick, Ga.	134					134	440	135
Burlington, Iowa.	294	101	1	1	1, 601	193	352	54
Cairo, Ill.	664	102		1	640	562	1, 892	116
Calais, Maine								29
Cambridge, Md.	79	5			32	74	286	31
Cape May, N. J.	1, 561	48			252	1, 513	3, 742	136
Charleston, S. C.	1, 256	77	1	1	1, 086	1, 179	3, 783	592
Charlotte Amalie, V. I.	273	12			137	261	1, 456	14
Cincinnati, Ohio.	155	10	1	1	216	145	389	630
Cordova, Alaska	341	37		3	570	304	478	
Corpus Christi, Tex.	513	47	1	1	365	466	795	3
Crisfield, Md.	470	13	1		52	457	793	7
Duluth, Minn.	875	98		2	521	777	1, 229	896
Eastport, Maine ³	2					2	4	
Edenton, N. C.	15					15	62	3
Elizabeth City, N. C.	191	4			4	187	717	62
El Paso, Tex.	254	15		1	183	239	1, 276	393
Erie, Pa.	412	32			397	380	1, 380	1, 063
Escanaba, Mich.	41	4			30	37	49	21
Eureka, Calif.	175	8			75	167	477	21
Everett, Wash.	208	19	1		100	189	371	34
Fall River, Mass.	176	11		1	117	165	463	128
Gallipolis, Ohio.	307	14	1		84	293	789	62
Gary, Ind.	103	3			16	100	164	82
Gloucester, Mass.	321	14			70	307	969	59
Grand Haven, Mich.	290	29			227	261	589	286
Green Bay, Wis.	106	7			35	99	364	65
Gulfport, Miss.	153	5			30	148	212	58
Hancock, Mich.	123	10	1		63	113	150	90
Hatteras, N. C. ⁴	332	14			108	318	1, 072	2
Honolulu, T. H.	2, 835	337	3	17	5, 551	2, 498	7, 920	1, 405
Houston, Tex.	1, 555	59	1		243	1, 496	5, 151	230
Indiana Harbor, Ind.	178	2			67	176	256	
Jacksonville, Fla.	928	66		1	578	862	1, 968	1, 277
Juneau, Alaska	435	34	3	1	430	401	633	76
Ketchikan, Alaska	1, 415	95	4	1	968	1, 320	2, 564	64
La Crosse, Wis.	17	2			13	15	31	66
Lewes, Del.	332	44		1	533	288	662	24
Los Angeles, Calif.	6, 148	602	1	16	7, 386	5, 546	18, 448	5, 783
Ludington, Mich.	183	5		1	136	178	348	5
Machias, Maine.	43					43	75	7

³ Closed Aug. 18, 1939.⁴ Opened Dec. 15, 1939.

TABLE 2.—*Transactions at United States marine hospitals and other relief stations—Continued*

Hospital or relief station	Total number of patients treated	Number of patients treated in hospitals	Died	Patients remaining in hospitals June 30, 1940	Number of days relief in hospitals	Number of patients furnished office relief	Number of times office relief was furnished	Number of physical examinations
SECOND- AND THIRD-CLASS STATIONS—continued								
Manila, P. I.	856	39	2	1	790	817	1, 639	1, 247
Manistee, Mich.	94	4	—	—	55	90	531	33
Manitowoc, Wis.	255	17	—	—	235	238	464	12
Marquette, Mich.	197	21	—	—	242	176	1, 239	87
Marshfield, Oreg.	357	17	1	—	101	340	457	53
Menominee, Mich.	95	3	—	—	42	92	187	32
Miami, Fla.	2, 238	163	6	3	1, 242	2, 075	6, 005	703
Milwaukee, Wis.	1, 421	169	1	2	1, 833	1, 252	2, 579	1, 502
Morehead City, N. C.	709	62	3	1	822	647	2, 240	22
Muskegon, Mich.	130	12	—	—	248	118	178	26
Nantucket, Mass.	103	14	—	—	93	89	327	1
Nashville, Tenn.	43	—	—	—	—	43	102	231
Natchez, Miss.	506	37	1	—	175	469	1, 563	34
New Bedford, Mass.	445	53	—	1	532	392	745	201
New Bern, N. C.	212	18	—	—	110	194	385	38
New Haven, Conn.	191	26	1	—	210	172	270	319
New London, Conn.	993	26	1	2	193	967	1, 458	184
Newport, Oreg.	211	14	1	—	167	197	447	9
Newport, R. I.	312	46	1	4	1, 032	266	317	53
Newport News, Va.	340	—	—	—	—	340	771	24
Ogdensburg, N. Y.	61	5	—	—	51	56	174	57
Olympia, Wash.	70	11	—	1	177	59	71	7
Oswego, N. Y.	280	21	—	—	43	259	436	134
Panama City, Fla.	675	23	—	1	165	652	2, 168	140
Paducah, Ky.	943	15	—	—	97	928	2, 895	335
Pensacola, Fla.	745	63	3	—	464	682	2, 664	185
Perth Amboy, N. J.	89	3	—	—	13	86	134	55
Petersburg, Alaska	299	27	—	—	199	272	947	—
Philadelphia, Pa.	7, 681	443	3	12	3, 922	7, 238	30, 477	7, 117
Ponce, P. R.	205	20	1	—	371	185	220	12
Port Angeles, Wash.	354	36	—	—	117	318	388	97
Port Arthur, Tex.	2, 817	7	1	—	35	2, 810	10, 480	1, 555
Port Huron, Mich.	369	10	1	—	67	359	737	1, 401
Portland, Oreg.	3, 788	310	2	9	3, 947	3, 478	14, 010	3, 834
Port Townsend, Wash.	286	—	—	—	—	286	992	12
Providence, R. I.	547	37	1	—	404	510	1, 109	1, 481
Provincetown, Mass.	379	—	—	—	—	379	1, 161	9
Reedville, Va.	769	—	—	—	—	769	1, 958	10
Richmond, Va.	103	10	—	—	134	93	187	153
Rock Island, Ill.	10, 358	13	—	—	81	10, 345	36, 397	3, 757
San Diego, Calif.	813	58	—	3	1, 434	755	2, 490	1, 125
Sandusky, Ohio	127	7	—	—	13	120	160	24
San Juan, P. R.	1, 372	81	1	5	1, 216	1, 291	4, 829	679
San Pedro, Calif.	6, 088	570	9	10	5, 184	5, 518	17, 353	1, 822
Sault Ste. Marie, Mich.	1, 333	107	2	3	1, 013	1, 226	1, 843	311
Seward, Alaska	438	61	1	1	678	377	545	26
Sheboygan, Wis.	85	1	—	—	7	84	135	71
Sitka, Alaska	362	8	—	—	53	354	901	—
South Bend, Wash.	66	13	—	—	110	53	74	1
Southport, N. C.	1, 387	171	2	5	1, 852	1, 216	1, 479	1
Superior, Wis.	359	48	—	3	419	311	522	67
Tacoma, Wash.	369	12	—	—	77	357	1, 000	179
Tampa, Fla.	1, 120	69	4	1	697	1, 051	2, 065	588
Toledo, Ohio	689	98	2	3	944	591	1, 145	331
Unalak, Alaska	124	27	1	4	390	97	181	6
Vicksburg, Miss.	403	16	—	—	89	387	1, 545	170
Washington, D. C.	8, 792	342	7	12	4, 350	8, 450	51, 906	19, 342
Washington, D. C. (dental clinic)	1, 902	—	—	—	—	1, 902	7, 530	—
Washington, N. C.	127	7	—	—	65	120	133	14
White Stone, Va.	539	—	—	—	—	539	1, 660	11
Wilmington, N. C.	747	110	—	1	772	637	1, 203	93
Wrangell, Alaska	370	30	—	1	189	340	917	—
FOURTH-CLASS STATIONS								
Bridgeport, Conn.	31	12	—	1	179	19	20	—
Chattanooga, Tenn.	19	3	—	—	42	16	28	15
Fort Yukon, Alaska	10	—	—	—	—	10	11	—
Hartford, Conn.	1	1	—	—	1	—	—	—
Nome, Alaska	18	2	—	—	25	16	17	3
Portsmouth, N. H.	22	3	1	—	49	19	20	—
Wilmington, Del.	37	—	—	—	—	37	66	—

TABLE 2.—*Transactions at United States marine hospitals and other relief stations—Continued*

Hospital or relief station	Total number of patients treated	Number of patients treated in hospitals	Died	Patients remaining in hospitals June 30, 1940	Number of days relief in hospitals	Number of patients furnished office relief	Number of times office relief was furnished	Number of physical examinations
MISCELLANEOUS								
Curtis Bay, Md. (U. S. Coast Guard).....	6, 514	-----	-----	-----	-----	6, 514	19, 474	457
U. S. Coast Guard Academy, New London, Conn.....	3, 961	267	2	2	1, 657	3, 694	16, 635	641
St. Elizabeths Hospital, Washington, D. C.....	189	189	2	177	63, 225	-----	-----	-----
Special acting assistant surgeons for Coast Guard and Coast and Geodetic Survey.....	4, 916	89	-----	3	459	4, 827	12, 249	1, 011
U. S. Coast Guard vessels and bases.....	9, 733	-----	-----	-----	-----	9, 733	41, 188	948
U. S. Maritime Service.....	16, 359	-----	-----	-----	-----	16, 359	44, 320	6, 221
Motorized dental stations.....	1, 978	-----	-----	-----	-----	1, 978	6, 735	-----
Emergency medical relief activities, Treasury Department.....	22, 407	-----	-----	-----	-----	22, 407	124, 375	38
Emergency medical relief activities, other agencies.....	6, 880	-----	-----	-----	-----	6, 880	49, 242	-----
Emergency.....	120	8	-----	-----	46	112	281	1
Total.....	170, 580	6, 756	92	336	132, 409	163, 824	616, 796	74, 650
Grand total.....	423, 661	69, 937	1, 517	5, 378	2, 031, 593	353, 724	1, 442, 196	213, 778

TABLE 3.—*Medical services for various classes of beneficiaries*

Beneficiary	Total number of patients treated	Number of patients treated in hospitals	Died	Patients remaining in hospitals June 30, 1940	Number of days relief in hospitals	Number of patients furnished office relief	Number of times office relief was furnished	Number of physical examinations
American seamen.....	164, 421	29, 052	651	2, 632	1, 031, 980	135, 369	538, 029	21, 097
Foreign seamen.....	1, 488	805	16	59	17, 364	683	2, 294	2
Coast Guard.....	48, 873	4, 996	54	294	121, 249	43, 877	158, 389	15, 489
Coast Guard dependents.....	10, 271	677	7	19	4, 775	9, 594	40, 677	99
Bureau of Fisheries.....	70	12	-----	2	610	58	155	1
Army.....	359	88	-----	-----	742	271	810	273
Navy and Marine Corps.....	574	224	4	15	2, 631	350	1, 093	42
Engineer Corps and Army Transport Service.....	7, 420	1, 560	24	127	42, 642	5, 860	22, 591	3, 585
Coast and Geodetic Survey.....	970	111	1	7	2, 883	859	2, 806	397
Coast and Geodetic Survey dependents.....	352	35	-----	-----	420	317	1, 189	4
Employees' Compensation Commission.....	35, 724	4, 702	27	232	86, 034	31, 022	147, 084	27, 163
Veterans' Administration.....	7, 739	7, 675	598	650	221, 148	64	820	3, 155
Immigration Service.....	5, 701	2, 037	10	118	38, 371	3, 664	8, 610	1, 724
Public Health Service officers and employees.....	18, 569	1, 590	20	44	22, 220	16, 979	74, 268	2, 195
Patients afflicted with leprosy.....	436	435	28	372	134, 015	1	1	4
Civilian Conservation Corps.....	3, 109	2, 768	18	134	60, 229	341	554	4
Work Projects Administration.....	65, 888	12, 523	51	637	232, 853	53, 365	216, 706	64, 773
Maritime Service.....	15, 940	276	-----	24	6, 309	15, 664	41, 200	7, 230
Miscellaneous.....	35, 757	371	8	12	5, 118	35, 386	184, 920	66, 541
Total.....	423, 661	69, 937	1, 517	5, 378	2, 031, 593	353, 724	1, 442, 196	213, 778

TABLE 4.—*Classification of out-patient treatments furnished at United States marine hospitals and other relief stations*

	General medical	Dental	Eye, ear, nose and throat	Neuropsychiatric	Tuberculosis	Surgical	Venereal diseases	Tumor clinic ¹	Inoculations and vaccinations	Arsenicals	Physiotherapy and X-ray	Total
Marine hospitals.....	105, 237	179, 988	49, 925	168	536	138, 160	78, 767	502	10, 845	26, 945	234, 327	825, 400
Other relief stations...	75, 873	25, 368	18, 311	274	523	116, 335	19, 868	---	14, 132	12, 688	38, 399	321, 771
Special acting assist- ant surgeons.....	6, 725	160	543	2	---	1, 310	55	---	3, 412	9	33	12, 249
Coast Guard vessels and bases.....	24, 163	7, 949	7, 042	63	71	7, 993	1, 605	---	4, 946	613	3, 378	57, 823
Maritime Service.....	21, 262	1, 454	3, 597	19	---	5, 265	1, 672	---	9, 641	554	856	44, 320
Motorized dental sta- tions.....	---	6, 735	---	---	---	---	---	---	---	---	---	6, 735
Emergency medical relief activities, Treasury Depart- ment.....	68, 532	---	20, 230	---	---	35, 613	---	---	---	---	---	124, 375
Emergency medical relief activities, oth- er agencies.....	31, 211	---	7, 696	---	---	10, 335	---	---	---	---	---	49, 242
Emergency.....	281	---	---	---	---	---	---	---	---	---	---	281
Total.....	333, 284	221, 654	107, 344	526	1, 130	315, 011	101, 967	502	42, 976	40, 809	276, 993	1, 442, 196

¹ Baltimore, Md.

DIVISION OF VENEREAL DISEASES

Assistant Surgeon General RAYMOND A. VONDERLEHR in charge

THE VENEREAL DISEASE CONTROL ACT

Public demand for control of venereal diseases in the United States is being met. This second year of the operation of the Venereal Disease Control Act finds many indices showing progress in terms of increased and improved diagnostic and treatment facilities, measures directed toward finding infected patients at an early stage of the disease and holding them until the maximum benefit from treatment has been obtained.

This progress in protecting our great natural resource, the health of the people of the United States, especially as it relates to freedom from venereal diseases, has been achieved through the forward-looking policy of the Congress, the States, and local governments in providing funds to get the campaign under way. In the present national emergency, this progressive step is resulting in an effective program for the prevention and control of the venereal diseases.

DIAGNOSTIC AND TREATMENT FACILITIES

For both syphilis and gonorrhea, existing diagnostic and treatment facilities have been expanded and new facilities established during the year. From a total of approximately 1,750 clinics and dispensaries for the treatment of venereal diseases as of July 1, 1938, these facilities increased to 2,400 as of July 1, 1939, and to 2,900 as of July 1, 1940. Fully as significant as the establishment of new clinics has been the expansion of previously existing treatment facilities, resulting in increased service to patients. Over the same period, private physicians have been able further to supplement these treatment services to the medically indigent by utilizing cooperative services provided by State and local health authorities. Today, every State health department offers the private physician drugs, laboratory, and epidemiological services for the care of the medically indigent, and, in many instances, for all patients regardless of their financial status.

Commensurate with the expansion of the treatment facilities, has been the increase in the number and capacity of the laboratories for the detection of venereal diseases. At the present time, there are over 2,000 laboratories performing tests for venereal diseases. Of this total, three-fourths are privately owned and operated, while the remainder are operated by State and local health agencies. Some idea of the extent of this expansion is apparent from the increased number of serologic tests for syphilis performed in laboratories reporting to State health departments. These laboratory tests increased some 300 percent in 1940 over those made in 1936 (2,000,000 in 1936; 9,000,000

in 1940). In fact, from 1939 to 1940 the serologic blood tests for syphilis reported to State health departments increased from 5,500,000 to 9,000,000. Since the detection of syphilis is to a large extent dependent on mass blood-testing, this increase in laboratory tests for syphilis is perhaps the best index of the effort which has been made to discover and bring to treatment infected individuals.

The increase in the number of tests for gonorrhea by State laboratories is also significant. This figure has doubled, from approximately 600,000 in 1939 to 1,100,000 in 1940. For the most part, the tests have been the examination of smears, although culture work also has increased. Some 16,000 cultures were made during the fiscal year.

A further indication of the increase in treatments for syphilis is available from a report of the drug sales. For example, in the calendar year 1939, 12,400,000 doses of arsenical drugs were sold, as contrasted with 7,700,000 in 1936. It is estimated that more than 50 percent of the arsenical drugs now sold are being purchased by State health departments for distribution. Of these drugs, approximately 30 percent are furnished free to private physicians for use in the treatment of indigent or part-pay patients.

More and more emphasis is being placed on the prevention and control of gonorrhea. This emphasis is due to the advent of the use of the sulfonamide compounds in the treatment of gonorrhea. For the first time a drug is available which effectively shortens the period of communicability of gonorrhea. Perhaps no drug has become so universally used by the general practitioner in so short a time as has this drug. The health departments have made a sulfonamide compound available to treatment sources in the amount of 3,500,000 tablets in 1939 and over 6,000,000 in 1940.

CASE-FINDING

There is some evidence to indicate that the improved treatment facilities have encouraged infected individuals, especially in the lower economic brackets, to seek treatment while the disease is still in the early stage. Today, some 43 percent of the persons reported as seeking treatment from all sources have syphilis of less than 4 years' duration. Perhaps more encouraging still is the fact that 17 percent are reported as beginning treatment in the primary or secondary stage. This means that in these cases treatment will be received not only when the best results can be obtained for the individual patient but also the greatest protection against the spread of the disease in the community.

Among the more important factors responsible for the increased proportion of persons seeking treatment early in their infection are:

1. Provision for privacy during examination of the patient.
2. Increased medical staff to allow greater personalization of the service.
3. Education particularly directed toward the youth of the Nation.
4. Higher "index of suspicion" on the part of the physician.
5. Availability of effective treatment schedules for early syphilis as a result of the efforts of the Cooperative Clinical Group.
6. Investigation of contacts of known cases of syphilis.
7. Legislation requiring premarital and prenatal blood tests for syphilis.

Twenty States now require blood tests for syphilis prior to issuance of a marriage license. Of a total of 600,000 such blood tests for syphilis, an average of 1.5 percent positive results were found. This percentage of positives discovered in the age group 18 to 25 is highly significant because this group of the population represents not only potential mothers and fathers of the Nation, but also potential manpower for industry and national defense.

In conjunction with this type of mass blood-testing, the State health officers have furnished to both private physicians and clinics additional facilities for the discovery of new infections. Epidemiological service rendered physicians and clinics by the State health departments through trained physicians, public health nurses, and social service workers has proved an effective method of case-finding. This consists of locating and examining exposed contacts of new infectious patients. The particular value of contact epidemiology lies in the fact that there exists a high correlation between the syphilis of the patient and that of the contact. Intelligent follow-up of contacts of patients with early infectious syphilis will bring new patients to treatment much earlier in the course of the infection than any other method.

Another factor in stimulating case-finding activities has been the work of voluntary community agencies. Such agencies, through their popular educational campaigns and through their efforts to promote closer cooperation between professional, official, and lay groups, have been instrumental in stressing the necessity for early and adequate treatment. That part of the educational work of these agencies directed toward youth groups is particularly important because 75 to 80 percent of all patients with syphilis become infected between the ages of 16 and 30. Four-fifths of the early infectious syphilis is contracted in these ages, although this age group represents less than 30 percent of the total population. The concentration of early syphilis is from 8 to 10 times greater in this age group than in all other age groups.

The cooperation of the pharmaceutical societies in refusing to provide drugs without medical advice for the treatment of venereal disease also has been effective as a method of routing infected individuals to the proper treatment sources.

Through a greater realization on the part of industry that syphilis does not pay, campaigns have been organized in many leading industries under the leadership of the United States Public Health Service and State and local health departments for the finding and treatment of workers with venereal diseases. An integral phase of such programs has been the plan of providing treatment to workers in industry without interruption of employment.

CASE-HOLDING

One of the principal problems in the control of venereal diseases has been that treatment sources have had difficulty in holding patients until they have received the maximum protection from therapy. The long period of treatment accompanied by crowded, inadequately equipped treatment facilities has in part been responsible. Improvement of the treatment and case-holding facilities has already brought about some progress, although there still is much to be desired. Prior

to the inauguration of this recent campaign, only some 15 percent of the patients were held until they had received the minimum required therapy. Today, in the 1,000 clinics which are now receiving continuous and cumulative reports from the mechanical reporting system this percentage has increased spectacularly to approximately 58 percent.

GONORRHEA

Throughout the world the control of gonorrhea has not kept pace with that of syphilis, not because it was not recognized as being the most prevalent infectious disease except for the common cold, but because there seemed to be no satisfactory means to detect and treat this infection on a mass scale. This situation changed with the advent of the sulfonamide compounds and the development and more general use of cultural methods for the determination of diagnosis and cure.

The United States Public Health Service, in cooperation with the American Neisserian Medical Society during the past year, pooled its material and resources in an effort to evaluate the effectiveness of this drug and in order to prepare a standard schedule of treatment for use of the general practitioner. The study revealed that sulfanilamide fell short of the performance which was attributed to it when it was first introduced. However, it did offer a simple, inexpensive method of treatment which shortened the period of communicability of this disease. Further, with the use of the cultural methods, there was made available a satisfactory method of determining "cure." The response of the medical profession to the work of this cooperative group encouraged it to carry on for a second year and to undertake an appraisal of the sulfonamide compounds in the treatment of gonorrhea in the female.

In addition to these prospective research studies, a cooperative plan with some 50 private physicians has been developed, designed to appraise rapidly the toxicity and therapeutic effectiveness of some of the newer sulfonamide compounds. The introduction of these drugs for the treatment of gonorrhea in the Johns Hopkins Clinic in 1937 resulted in a dramatic reduction in the number of persons seeking treatment for gonorrhea at this institution. In fact, 6 months after the drug was introduced, surveys of treatment sources in the city of Baltimore indicated that the number of persons seeking authorized medical care for gonorrhea had dropped precipitately. At the time, this statement was not released because it indicated such a change that it was felt best to wait for its confirmation through a series of surveys. However, during the past year a survey was made in the District of Columbia which indicated a situation similar to that found in the Baltimore survey. These statements, of course, are subject to confirmation by a larger series of surveys and further investigation.

Practically all State health departments now furnish sulfonamide compounds to clinics for the treatment of gonorrhea. Now that effective procedures are available, it is anticipated that it will be possible to make real progress in the mass control of gonorrhea during the coming year. Areas strategic to the national defense program will receive special consideration.

COOPERATION WITH NATIONAL DEFENSE PROGRAM

In the Congressional hearings on the Appropriation Bill for 1941 the well-recognized relationship of venereal diseases to the national defense received serious consideration. Also, the point was brought out that unless these diseases are adequately controlled in maneuver areas, enlisted men will act as foci for their dissemination at home.

Therefore, the United States Public Health Service is cooperating fully with the Medical Corps of the Army, the Bureau of Medicine and Surgery of the Navy, with State and local health departments, and with interested voluntary organizations in instituting special control measures in civilian and military populations where Army or Navy forces are concentrated.

At the time of the maneuvers in western Louisiana and eastern Texas along the Sabine River, officers of the United States Public Health Service made a survey of conditions and submitted recommendations. State and local health agencies and voluntary organizations were then requested to cooperate with the Army and the Public Health Service in carrying out needed measures for the improvement of general health conditions and the control of the venereal diseases. This policy will be continued in other maneuver areas.

It is fully as important from the standpoint of national defense to control the venereal diseases in the general population as in the Army and Navy. The first draft in 1917 revealed an appallingly high proportion of venereally infected individuals among the men called up. Obviously this was a reflection of the high prevalence of the venereal diseases in the general population. Furthermore, success in modern war is dependent to a larger extent than ever before upon the industrial and agricultural efficiency of the Nation. The degree of such efficiency is largely conditioned by the health of the population.

Therefore, the entire venereal disease program, rather than concentration upon maneuver areas alone, should be considered an important factor in the national defense program.

COOPERATIVE WORK WITH STATE HEALTH DEPARTMENTS

Every State has certified that it is now providing "minimal venereal disease control services," along the lines recommended by State and local health authorities and medical experts in 1936 and now embodied in section 15 of "Regulations Governing Allotments and Payments to the States for Venereal Disease Control Activities for the Fiscal Year 1940" which went into effect on January 1, 1940.

These minimal services outline what is believed to be the most effective program that can be developed under the varying social and economic conditions in the United States with the funds now available. The United States Public Health Service will judiciously enforce these minimal standards with due regard to varying local conditions and with appreciation of the human problems involved.

In order to assist the State and local health departments in directing their programs along lines which conform with established and well-recognized procedure, the Public Health Service has assigned a number of its officers in a consultative capacity to various States and

municipalities and as consultants in the five regional areas. In addition, three officers are serving as consultants-at-large, two in the field of industrial syphilis. As officers have completed courses of training in the public health control of the venereal diseases, additional ones have been assigned to this type of work.

The policy of allowing certain portions of the funds allotted to the States to be budgeted for the training of personnel has been continued.

The Public Health Service has continued to cooperate with various State and local health departments in conducting research projects for the study and demonstration of special aspects of the venereal diseases and their public health control.

Under the auspices of the United States Public Health Service a regional conference to consider problems arising in connection with the control of venereal diseases in the South was held in Atlanta, Ga. There were 133 registrants, including Surgeon General Parran, other officers of the United States Public Health Service, officers of the United States Army, and health officials of 16 southern States and the District of Columbia. A number of important topics dealing with diagnosis, treatment, control, and legislation were discussed and some 40 resolutions for future guidance were adopted.

COOPERATIVE RESEARCH STUDIES WITH OTHER AGENCIES

The Division of Venereal Diseases continues to cooperate in many research projects. These have been planned and coordinated in such a way as to bring about rapid, orderly advances in medical knowledge of venereal diseases. Group effort with pooling of experience by experts continues to be the keynote.

The studies on the treatment with sulfonamide compounds of gonorrhea in the male and in the female have been described.

The gonococcal vaginitis research project led this year to the conclusion that this condition is not so highly contagious as it is generally believed to be. Diagnostic and treatment procedures were evaluated, and conclusions important to any prospective control of the disease were made. With one treatment method, apparent cures within 1 week were obtained in over 90 percent of the cases of gonococcal vaginitis.

Progress was made in the study of the epidemiology and biology of gonococcal infection. Valuable observations were made relating to gonococcus carriers, drug-resistant strains of the gonococcus, and other problems.

Further research into problems along the frontier of our knowledge of syphilis was the subject of additional cooperative projects. As examples of the problems studied may be mentioned fever therapy, alone and combined with arsenical treatment; the thermal death time of *Treponema pallidum*; transmissibility of syphilis by various body secretions and discharges; and the diagnosis and epidemiology of congenital syphilis. These are in addition to the studies of the Cooperative Clinical Group which were continued throughout the year.

Looking toward the elimination of much of the nonuniformity and nonspecificity sometimes encountered in serologic tests for syphilis, a new project was started with the purpose of devising methods for purification of the antigen used in such tests. Already a method which shows real promise has been developed.

Under the direction of a commissioned officer of the Public Health Service, the Syphilis Research Center at Johns Hopkins Hospital is conducting investigations of three problems. One of these is the development and study of trivalent arsenical derivatives for the purpose of determining the relationship between chemical structure, antisyphilitic activity, and toxicity. The second problem is an experimental study of the principles underlying the intensive 5-day drip therapy of syphilis recently suggested. The third problem under investigation is the preparation and study of cultures of spirochetes suitable for the serum diagnosis of syphilis, in the hope of finding a method of further minimizing nonspecific reactions.

Additional cooperative research projects include studies of lymphogranuloma venereum, chancroid, and granuloma inguinale.

COOPERATIVE CLINICAL GROUP STUDIES

Current studies on syphilis before the Cooperative Clinical Group include:

Symptomatic neurosyphilis.—A study designed to show the most effective means of treating patients with tabes, paresis, taboparesis, meningeal, meningovascular, or vascular neurosyphilis. The report on tabes has appeared, and a paper covering the other five types of neurosyphilis is being prepared.

Efficacy of modern treatment in early syphilis.—Two reports on the end results of treatment of early syphilis in terms of serologic and clinical response were released for publication by the cooperating clinics during the year.

Cardiovascular syphilis.—The collection of records for a prospective study designed to establish satisfactory criteria for the diagnosis of uncomplicated aortitis continued during the year.

Frequency of syphilis as a cause of death.—The basic data from some 10,000 autopsy records have been completed in the study to determine the frequency of syphilis as a primary or contributory cause of death.

Follow-up of apparently normal children born of syphilitic parents.—This study has the purpose of determining the reliability of the present criteria for the diagnosis of early congenital syphilis. The data have been assembled and are in process of statistical evaluation.

Interstitial keratitis.—A cooperative report is ready for release. It shows that treatment in the inactive stage of interstitial keratitis is of limited value; that iodides in the treatment of this condition exert an unfavorable influence on final vision; and that best results are obtained from routine syphilitic treatment with the addition of fever therapy.

Syphilis in pregnancy.—The purpose of this study is to determine when treatment of syphilitic women during pregnancy is imperative and when optional. Clinical records are being abstracted.

Benign late syphilis.—Records of 850 patients with benign late syphilis are being analyzed to determine the end results of various schemes of treatment.

Nonspecific therapy in the treatment of neurosyphilis.—A report showing the relative effectiveness in paresis of various types of non-specific therapy with and without chemotherapy has been prepared and is ready for release.

VENEREAL DISEASE RESEARCH LABORATORY
STAPLETON, STATEN ISLAND, N. Y.

The Venereal Disease Research Laboratory has continued investigations pertaining to the clinical and laboratory aspects of the venereal diseases. Research studies concerning the treatment and laboratory diagnosis of syphilis and gonorrhea have consumed the major part of effort. The laboratory has also cooperated with many State and other governmental units in improving laboratory routine and in evaluating the work of several such organizations.

The expansion of serologic activities made it advisable to open a branch of the institution for the western area of the country. This branch, staffed by technical personnel transferred from the Staten Island organization, is housed in the Public Health Service Laboratory in San Francisco.

The laboratory supervised the annual evaluation of efficiency of performance of serodiagnostic procedures participated in by all the States and the District of Columbia. Assistance has been rendered to 11 States in intrastate evaluation studies. Training and refresher courses in serologic techniques have been given to 47 technical workers, representing 3 Federal, 14 State, 4 city or county, 4 teaching, and 7 other institutions.

More than 73,500 serologic tests were carried out on 24,800 specimens. Lyophile complement, hemolysin, and the several serologic antigens and colloidal gold solution were prepared for use and distribution to Federal and other laboratories.

A preliminary study on the adaptability of lyophilized human serums in serologic evaluation studies was carried out.

The chemistry laboratory has been made ready for work. The personnel of this department, working with the serology group, have undertaken the investigation of basic problems relating to purification and preparation of the lipoidal antigens. The three departments, chemistry, bacteriology, and serology, are continuing their efforts toward the development of a reliable serodiagnostic test for gonorrhea.

Clinical and laboratory studies of the sulfonamide group of substances in the chemotherapy of gonococcal infections extended throughout the year. In cooperation with the marine hospitals and several other institutions of the metropolitan area, more than 3,000 patients were studied. Routine laboratory work for this group necessitated the preparation and examination of 15,570 culture plates and 8,000 spreads.

Research efforts in bacteriology have been directed toward improving the cultural and staining methods of *Neisseria gonorrhoeae*.

Many nutrient and toxic substances have been investigated during the year.

New compounds suitable for local application or oral administration for the prevention of syphilis have been used in prophylactic experiments. The studies on seminal fluid transmission of syphilis have been resumed in the late latent group of syphilitic patients.

The basic preliminary studies have been made for establishing the phases in the life cycle of *Spirochaeta pallida* by means of the ultraviolet light microscope. The application of visible light with special optical systems has made it possible to visualize and photograph cultured spirochetes at greatly increased magnifications with the organism either at rest or in motion. The study of the cycle has included further efforts in culturing the organism on artificial media and in comparative histopathological studies of normal and infected tissue after various changes in physical and chemical environmental factors.

SYPHILIS CONTROL IN INDUSTRY

The Public Health Service has continued to cooperate with the Civil Service Commission in the study of medical records of all applicants for positions in the Government service who have a diagnosis, history, or physical findings suggesting a syphilitic infection, for the purpose of determining their physical eligibility for employment. During the fiscal year the medical records of 623 applicants were reviewed. Of these, 132 were found physically qualified and were recommended for appointment. Another 64 were found physically fit for employment but had not received adequate antiluetic treatment and observation. The latter group was recommended for probational appointment pending the outcome of treatment and observation. It was found that 73 applicants could not be recommended for employment because of syphilitic involvement of the heart, nervous system, and other organs which would have increased the retirement risk. No opinion was given regarding the physical condition of 325 individuals because they failed to respond to requests for additional information or to submit to special examinations. A total of 134 cases were still pending action on June 30, 1940, because of insufficient information. A number of State health departments and Federal agencies have assisted in this study by furnishing records of treatment and by performing examinations on applicants who were unable to pay for the services of a private physician. The policies of the Civil Service Commission often influence private industries.

Syphilis control in industry constitutes one of the most important problems with which this Division has to deal. It has taken on new and additional importance of an emergency nature since the inception of the national defense program with its contemplated expansion of armament production and complementary industries.

The commissioned officer assigned to this work continues to give it his full-time attention as consultant-at-large. In addition, the officers assigned to districts and States as consultants in venereal disease control find many of their activities related to ramifications of this problem.

The general lines of the program for the control of syphilis in industry are now well established. It involves cooperation of industrial organizations with State and local health departments, private physicians, and industrial physicians. The recommended program is similar to that for control of syphilis in the general population, with the additional feature of the relationship of the disease to the individual's industrial risk. Public health workers in conferences with industrial leaders and industrial physicians and through other contacts have succeeded to a large extent in clarifying this relationship and in initiating and guiding numerous projects which have gone far to promote the interests of industry, employee, and community with respect to syphilis.

EDUCATIONAL AND INFORMATIONAL ACTIVITIES

Educational and informational activities have increased as the cooperative program with the States has developed.

State and local health departments and voluntary health agencies in ever-increasing numbers have called on the Public Health Service for aid in developing educational programs. The recent Conference of Southern State Health Officers urged that facilities for this type of work be expanded, and asked that the Public Health Service disseminate information about educational activities and techniques. As a result, consultative activities have been expanded.

To provide basic data upon which to build a continuing program, a venereal disease education evaluation study has been undertaken in cooperation with the American Social Hygiene Association. It will provide a direct measure of the effectiveness of the general educational program up to the present time and will reveal important attitudes and opinions relating to social and public health problems involved in venereal disease control.

Other research activities included an extensive survey of "quack" practices, carried out in cooperation with the American Social Hygiene Association; a study of State educational publications; and a study in cooperation with a large metropolitan health department to evaluate the effectiveness of visual education material.

Publications.—Three new publications have been released to the public: Venereal Disease Folder No. 5, "Gonorrhea the Crippler"; Venereal Disease Folder No. 6, "Are You Being Played for a Sucker?"; and Venereal Disease Bulletin No. 93, "Twenty Questions on Gonorrhea." Venereal Disease Bulletin No. 94, a pictorial booklet, "It Can Happen to You," has been completed and sent to the Government Printing Office. A preliminary outline has been drafted and editorial research begun for a pamphlet on the prophylaxis of venereal disease.

During the year the ever-growing stream of requests for publications totalled 20,885. As in the past, these requests came from organizations and groups such as Chambers of Commerce, women's and civic clubs, parent-teacher associations, youth groups, and health and welfare organizations, as well as from individuals.

In response to these requests, 385,871 publications were distributed free through the administrative offices. These included several series:

Venereal Disease Bulletins, Venereal Disease Information, Supplements to Venereal Disease Information, reprints of special articles appearing in Venereal Disease Information, educational publications, and Venereal Disease Folders. The total figure of 385,871 does not include publications sold by the Government Printing Office.

Attention has been given to problems of distribution and use of the new Venereal Disease Folder and Bulletin series. The extensive use of these publications is indicated in an accompanying table.

Posters.—The venereal disease poster series has been expanded under a scheme whereby a new poster will be issued each month. Three posters were published during the year: Venereal Disease Poster No. 7, "No Home Remedy or Quack Doctor Ever Cured Syphilis or Gonorrhea"; No. 8, "Face the Facts about Syphilis"; No. 9, "A Million New Victims Each Year." Two other posters were sent to press: No. 10, "Syphilis Strikes 1 in 10 Before 50"; and No. 11, "A Blood Test for Everyone." A small demand for the early posters, Nos. 1-6, still exists; 960 were distributed free during the past year.

Exhibits.—Experimentation has been carried out to develop more effective exhibit forms and 11 graphic units have been produced. These include eight folding panel exhibits: "Every Town Has Its Quack Racket * * *"; "U. S. Public Health Service Offers These Weapons Against Quacks"; "Gonorrhea in the Male"; "U. S. Public Health Service Publications on Gonorrhea"; "Photographs in Health Education" (3 panels); "Communicable Diseases." Single panels included "Two Vital Aids to High School Teachers"; "Health * * * A Growing Problem of Youth"; and 2 panels on syphilis case-finding and case-holding.

Radio and motion pictures.—A number of radio programs have been sponsored and a series of three transcriptions prepared for use by State departments of health and local radio stations.

Distribution of motion pictures has continued, with the film, "Three Counties Against Syphilis" most widely used.

Sex education.—Activities in the field usually referred to as "sex education" were carried out with an extensive series of conferences with various educational agencies, and through research. Education Publication No. 7, "High Schools and Sex Education," was published in November 1939. Up to June 30, 1940, 17,466 copies were sold by the Government Printing Office and 3,527 distributed free. The manuscript for another publication, "We Grow Up," was completed, and a testing edition published and widely distributed for comments.

Medical informational activities.—Of particular significance in the field of professional informational activities has been continued publication of the monthly journal of syphilis and gonorrhea, Venereal Disease Information. This publication contains, each month, several original articles and research papers in the fields of diagnosis, treatment, and public health research, as well as a summary, in abstract form, of the important current scientific and other papers dealing with venereal disease and which appear in publications throughout the world. Reprints are available of the original articles.

Venereal Disease Information has maintained its record of having the highest paid circulation of any government publication. During the fiscal year 1940, the monthly subscriptions averaged 12,666, an

increase of 848 over the preceding year. The total average monthly circulation, free and paid, was 19,380. A total of all copies distributed last year was 232,563 as compared to 176,832 for the fiscal year 1939.

Free and sales distribution of venereal-disease folders and bulletins

Title	Free, fiscal year 1940	Sales, fiscal year 1940	Date published	Total sales since re- lease
Venereal disease folder:				
No. 1—"Syphilis—Its Cause, Its Spread, Its Cure".....	22, 670	394, 272	Mar. 1938	1, 042, 775
No. 2—"Syphilis and Your Town".....	15, 565	185, 808	Dec. 1938	294, 203
No. 3—"You Can End This Sorrow".....	17, 264	294, 408	May 1939	343, 477
No. 5—"Gonorrhea the Crippler".....	50, 105	484, 595	Aug. 1939	484, 595
No. 6—"Are You Being Played For a Sucker?".....	12, 589	18, 438	June 1940	18, 438
Venereal disease bulletin: No. 93—"Twenty Questions on Gonorrhea".....	23, 125	24, 969	Feb. 1940	1 24, 939
Total.....	2 141, 315	1, 402, 490	-----	2, 208, 427

¹ 35,267 orders on hand at end of year, not included in total; supply exhausted, being reprinted.

² This figure included in total distribution figure of 385,871.

SUPPLEMENTS TO VENEREAL DISEASE INFORMATION, 1940

- No. 4. Hospitals and Dispensaries for the Treatment of Venereal Diseases (revised). 69 pages.
- No. 7. Syphilis in Mother and Child. By Harold N. Cole, M. D., and Philip C. Jeans, M. D., in collaboration with Joseph Earle Moore, M. D., Paul A. O'Leary, M. D., John H. Stokes, M. D., Thomas Parran, M. D., R. A. Vonderlehr, M. D. 20 pages

REPRINTS FROM VENEREAL DISEASE INFORMATION, 1940

- No. 111. Sulfanilamide in Gonococcal Infection: The Results of Treatment and the Leukocyte Response. By W. H. Y. Smith, Clarence K. Weil, and B. Crosby Bird. 5 pages.
- No. 112. The Advantages of the Vacuum Tube for the Collection of Serologic Specimens. By O. C. Wenger. 3 pages.
- No. 113. Postgraduate Courses in Syphilis Control. By R. H. Kampmeier and E. Gurney Clark. 4 pages.
- No. 114. Electrosurgical Treatment of Gonorrheal Endocervicitis. By Samuel Goldblatt. 7 pages.
- No. 115. Venereal Disease Contact-Tracing in Camden, New Jersey. By A. J. Casselman and Anabel Cadwallader. 10 pages.
- No. 116. The Outlook for Syphilis Control. By Louise Pearce. 8 pages.
- No. 117. The Quantitative Kahn Reaction. By Reuben L. Kahn. 3 pages.
- No. 118. Tryparsamide in the Treatment of Syphilis. By Josephine Hinrichsen. 30 pages.
- No. 119. Spirochete Counts in Early Syphilis. By George Vryonis and Hugh J. Morgan. 5 pages.
- No. 120. Syphilis Control. Case-Finding and Case-Holding. By Helen E. Woods. 5 pages.
- No. 121. Progress in Venereal Disease Control During the Fiscal Year 1939. 3 pages.
- No. 122. Illegal and Unethical Practices in the Diagnosis and Treatment of Syphilis and Gonorrhea. By Mary S. Edwards and Paul M. Kinsie. 10 pages.
- No. 123. Spirochete Complement Fixation Reaction Compared with the Eagle and Wassermann Procedures. By Paul T. Erickson and Harry Eagle. 7 pages.
- No. 124. Serologic Consultation Service. By John A. Kolmer. 4 pages.
- No. 125. Mechanical Tabulating System in Venereal Disease Control. By Lida J. Usilton. 7 pages.
- No. 126. Culture Method in Diagnosis of Gonorrhea. By Anne C. Pitts. 8 pages.

- No. 127. Address at Annual Meeting, American Social Hygiene Association, February 1, 1940. By Nathan B. Van Etten. 4 pages.
- No. 128. Evaluation of Performance of Serologic Tests for Syphilis in Georgia, 1939. By E. L. Webb, T. F. Sellers, and L. E. Burney. 5 pages.

VENEREAL DISEASE MEDICAL CENTER, HOT SPRINGS NATIONAL PARK, ARK.

On July 1, 1939, to simplify and to coordinate better the fiscal administration of the United States Public Health Service facilities in Hot Springs, the original Venereal Disease Out-Patient Clinic and the Medical Center dormitories and hospital were merged under the official title of United States Public Health Service Venereal Disease Medical Center. Heretofore separate property returns and separate pay rolls were submitted for the out-patient department and the in-patient department. This year a single property return and pay roll have been maintained covering all property and all civil service employees of the Service in Hot Springs.

During the year, 4,662 persons representing 43 States, the District of Columbia, and the Canal Zone, applied for treatment. Two thousand two hundred and eighty were admitted for the treatment of venereal diseases, including 1,512 cases of syphilis, 682 cases of gonorrhea, 40 cases of chancroid or Ducrey infection, 38 cases of venereal lymphogranuloma, and 8 cases of granuloma inguinale. One hundred and eighty-three patients presented multiple venereal infections at the time of admission. Three hundred and eighty-one registered applicants failed to return or were rejected following their examinations. The nonvenereal applicants, 2,194 in number, were referred to the out-patient clinics of the Leo N. Levi Memorial Hospital, a cooperating agency.

The total number of routine venereal disease treatments administered was 71,756, comprising 16,305 intravenous injections of arsenicals; 32,866 intramuscular injections of the heavy metals, bismuth and mercury; 1,907 other injections such as iodides, tartar emetic, fuadin, etc.; and 20,678 gonorrheal treatments. In the dental clinic, 4,485 treatments were given.

Beginning January 2, 1940, and continuing throughout the remainder of the year, a comparative study of the toxicity of neoarsphenamine and sulfarsphenamine has been conducted. Both drugs are given intravenously by the gravity method under parallel conditions, rigidly maintained. The products of 5 leading manufacturers of arsphenamines are being employed. At the close of the fiscal year, after the administration of 2,986 doses of neoarsphenamine and 3,207 doses of sulfarsphenamine, it appears that the former drug is equally as toxic as the latter.

In cooperation with the National Park Service, 3,338 regular monthly physical examinations of bath attendants (mostly masseurs) were performed and 88 new applicants for positions in the various bath houses were given complete physical examinations.

In the laboratory the following work was performed: 39,006 serologic tests for syphilis; 445 darkfield examinations; 450 intracutaneous tests; 15,790 slides for gonococci; 291 cultures for gonococci; 9,392 urinalyses; 907 spinal fluid tests; and 388 special examinations of sputum, feces, water, and milk.

Nineteen physicians, three nurses, and one bacteriologist took advantage of the training facilities at this clinic in the diagnosis and clinical management of the venereal diseases. Eight physicians were presented with certificates for having successfully completed the 1 month training course.

Information concerning 508 sources of infection and contacts, and notifications concerning 196 delinquent patients, who were considered potentially dangerous to the public health, were sent to the proper health authorities. One hundred and six replies concerning the source of infection and contacts and 41 replies concerning delinquent patients were received by this office from the respective health officers, indicating that appropriate action had been taken.

One thousand six hundred and eight patients representing 37 States received domiciliary care or hospitalization in the in-patient department. In the infirmary, 908 patients received 18,662 days' hospital care. Forty major and 448 minor surgical operations were performed in the hospital. Seventy-six patients received 448 fever treatments in the hypertherm cabinets and 70 patients were inoculated with therapeutic malaria. Three hundred and forty-eight Elliott treatments for pelvic inflammatory disease and prostatitis were administered. Nine hundred and seven lumbar punctures were performed. Twenty-six blood transfusions were made and 80 donors from among the patients and employees furnished 3,680 blood specimens for the laboratories participating in the 1940 Serodiagnostic Evaluation Survey.

New construction and remodeling of the hospital continued throughout the year under the Work Projects Administration. A brick and concrete warehouse was completed and occupied in June. Work in the hospital is three-fourths completed and a supplemental project has been approved for finishing this reconstruction early in the fiscal year 1941. The capacity of the hospital will be increased from 56 to 90 beds, with many added conveniences and desirable facilities including X-ray equipment.

MORBIDITY REPORTING

During the past fiscal year the monthly report form for clinics was revised so as to differentiate between patients admitted with previous treatment and without previous treatment.

A total of approximately 480,000 cases of syphilis and 180,000 cases of gonorrhea were reported to the several State and Territorial health departments. This number is practically the same as that reported for each of the 2 preceding fiscal years. A peak was reached in 1938 which has since been maintained. Approximately 25 percent of the syphilis reports and 50 percent of the gonorrhea reports were made by private physicians. White patients were represented by 32 percent of the syphilis reports and 60 percent of the gonorrhea reports.

The mechanical reporting system was extended to include over 1,000 clinics in 19 States as contrasted with the 500 clinics serviced in 1939. This system, which provides continuous, cumulative reports on venereal disease activities, has replaced more laborious and less accurate hand tabulations of fragmentary information and provides clinic directors and health officers with much more comprehensive and useful data in regard to their patients.

TABLE 1.—*Report of State departments of health showing the number of cases of syphilis and gonorrhea reported, the annual rates per 1,000 inhabitants, the amount of arsphenamine distributed, and the laboratory examinations made from July 1, 1939, to June 30, 1940*

State	Number of cases			Annual rate of syphilis and gonorrhea per 1,000 inhabitants	Doses of arsphenamine distributed	Laboratory examinations		
	Syphilis	Gonorrhea	Syphilis and gonorrhea			Serologic tests made	Microscopic examinations for <i>Spirochaeta pallida</i>	Examinations for gonococcus
Alabama.....	17,218	4,125	21,343	7.29	264,967	321,482	504	20,443
Alaska.....	110	246	356	5.68	3,377	13,111	23	134
Arizona.....	2,150	1,370	3,520	8.42	33,761	88,111	47	3,219
Arkansas.....	10,910	2,297	13,207	6.36	119,419	151,863	493	17,860
California.....	23,131	17,634	40,765	6.52	419,453	380,168	2,270	87,433
Colorado.....	1,813	892	2,705	2.51	31,740	154,669	23	4,583
Connecticut.....	2,050	1,260	3,310	1.89	34,447	109,332	17	5,237
Delaware.....	2,244	498	2,742	10.43	27,889	40,076	23	2,866
District of Columbia.....	6,843	3,407	10,250	16.12	11,799	173,168	47	31,621
Florida.....	23,677	1,985	25,662	15.10	77,314	621,579	153	33,473
Georgia.....	23,202	741	23,943	7.69	430,586	218,812	370	8,088
Hawaii.....	745	730	1,475	3.64	19,414	46,951	6	1,784
Idaho.....	489	194	683	1.36	8,593	86,476	38	3,742
Illinois.....	24,533	15,966	40,499	5.12	376,007	605,066	3,142	221,717
Indiana.....	7,363	1,463	8,826	2.53	58,617	328,098	0	8,536
Iowa.....	3,015	1,683	4,698	1.83	57,155	244,329	4	5,419
Kansas.....	2,851	1,257	4,108	2.20	54,938	81,316	46	4,355
Kentucky.....	7,627	3,746	11,373	3.84	157,664	108,894	502	8,484
Louisiana.....	7,290	1,020	8,310	3.88	161,469	297,361	1,032	6,493
Maine.....	420	434	854	.99	19,041	43,460	0	5,016
Maryland.....	10,511	3,356	13,867	8.23	87,908	125,776	367	7,758
Massachusetts.....	5,150	4,389	9,539	2.15	145,366	300,990	0	23,270
Michigan.....	11,183	6,866	18,049	3.70	175,464	452,526	1,288	79,003
Minnesota.....	2,847	2,273	5,120	1.92	14,326	231,359	47	12,122
Mississippi.....	41,499	29,349	70,848	34.73	287,782	228,351	32	6,197
Missouri.....	9,816	2,605	12,421	3.09	77,427	121,285	147	16,201
Montana.....	531	326	857	1.57	19,828	32,035	15	3,044
Nebraska.....	802	675	1,477	1.08	9,920	51,081	8	3,985
Nevada.....	312	189	501	4.91	6,406	12,260	7	4,721
New Hampshire.....	229	98	327	.64	9,821	58,217	0	3,129
New Jersey.....	11,086	3,158	14,244	3.27	121,125	201,418	12	9,420
New Mexico.....	1,642	518	2,160	5.11	27,912	54,672	1	2,815
New York.....	44,820	19,157	63,977	4.92	404,995	584,372	1,180	63,169
North Carolina.....	25,872	4,534	30,406	8.61	665,851	568,528	1,091	27,841
North Dakota.....	337	411	748	1.05	5,670	53,284	5	2,560
Ohio.....	13,029	3,592	16,621	2.46	171,805	327,517	89	33,192
Oklahoma.....	9,151	3,209	12,360	4.81	392,907	188,114	99	79,309
Oregon.....	1,661	1,461	3,122	3.01	19,910	86,759	77	6,557
Pennsylvania.....	14,421	1,520	15,941	1.56	336,404	169,060	42	18,037
Rhode Island.....	1,157	539	1,696	2.49	24,115	71,976	34	8,833
South Carolina.....	19,440	2,027	21,467	11.35	192,419	284,067	85	12,481
South Dakota.....	701	289	990	1.43	8,892	59,517	3	1,071
Tennessee.....	14,444	4,512	18,956	6.48	286,189	282,703	626	42,167
Texas.....	34,812	9,759	44,571	7.15	340,283	153,158	857	9,272
Utah.....	654	434	1,088	2.08	8,160	68,876	2	1,519
Vermont.....	197	192	389	1.01	8,257	15,696	14	1,391
Virginia.....	19,449	3,484	22,933	8.36	304,385	197,181	396	13,591
Washington.....	2,480	3,219	5,699	3.40	44,203	124,901	227	22,393
West Virginia.....	6,391	2,386	8,777	4.61	159,924	139,600	57	5,953
Wisconsin.....	1,086	1,176	2,262	.77	62,968	163,246	39	27,674
Wyoming.....	364	166	530	2.24	3,533	14,318	8	641
Virgin Islands.....	442	198	640	29.09	(²)	(²)	(²)	(²)
Puerto Rico.....	13,267	3,368	16,635	9.21	104,032	679,813	732	8,267
Total.....	487,464	180,383	667,847	5.04	6,895,837	10,216,978	16,327	1,038,086

¹ Second half not reported, based on first half.

² Doses of arsphenamine and laboratory examinations not reported.

TABLE 2.—*Report of 2,454 clinics, furnished through State health departments, July 1, 1939, to June 30, 1940*

State	New cases admitted during year			Monthly average number of patients under treatment			Total treatments given for syphilis and gonorrhea	Doses of arsphenamine administered	Doses of heavy metal administered
	Total	Syphilis	Gonorrhea	Total	Syphilis	Gonorrhea			
Total.....	355, 589	288, 778	66, 811	321, 374	290, 982	30, 392	9, 165, 490	3, 719, 880	4, 593, 916
Alabama.....	18, 061	16, 235	¹ 1, 826	7, 864	7, 423	¹ 441	269, 539	140, 701	123, 809
Arizona.....	1, 517	1, 149	368	1, 072	940	132	33, 061	12, 659	18, 457
Arkansas.....	7, 509	6, 670	839	5, 181	4, 951	230	202, 525	75, 298	107, 347
California.....	23, 053	14, 390	8, 663	18, 692	15, 618	3, 074	572, 194	192, 572	219, 816
Colorado.....	1, 715	1, 124	591	2, 080	1, 735	345	60, 642	16, 540	35, 520
Connecticut.....	1, 848	1, 282	566	1, 795	1, 559	236	48, 464	17, 052	21, 650
Delaware.....	1, 549	1, 247	302	1, 600	1, 515	85	44, 692	18, 473	23, 957
District of Columbia.....	6, 831	4, 519	2, 312	6, 439	5, 161	1, 278	147, 171	46, 665	74, 571
Florida.....	10, 093	9, 454	639	7, 472	7, 309	163	203, 035	111, 199	81, 950
Georgia.....	16, 164	15, 705	459	16, 930	15, 555	1, 375	442, 395	230, 357	208, 031
Hawaii.....	585	441	144	773	724	49	22, 200	9, 733	9, 501
Idaho.....	124	123	1	67	64	3	1, 910	805	1, 075
Illinois.....	19, 802	11, 186	8, 616	19, 864	17, 306	2, 558	654, 871	158, 891	376, 615
Indiana.....	6, 338	4, 974	1, 364	6, 665	5, 348	1, 317	177, 540	63, 340	96, 026
Iowa.....	1, 147	699	448	1, 196	1, 017	179	38, 553	11, 772	20, 949
Kansas.....	2, 031	1, 503	528	2, 002	1, 846	156	69, 466	24, 138	38, 410
Kentucky.....	6, 811	6, 811	(²)	10, 047	10, 047	(²)	277, 138	100, 714	176, 424
Louisiana.....	³ 7, 831	³ 7, 831	³ 351	³ 8, 310	³ 8, 080	³ 230	³ 292, 536	³ 126, 388	³ 162, 014
Maine.....	1, 351	742	609	967	742	225	31, 457	15, 213	11, 027
Maryland.....	7, 352	5, 316	2, 036	8, 603	7, 251	1, 352	176, 781	87, 530	65, 722
Massachusetts.....	4, 628	2, 676	1, 952	6, 379	4, 977	1, 402	186, 596	56, 700	84, 992
Michigan.....	6, 269	4, 170	2, 099	6, 333	5, 311	1, 022	168, 136	66, 992	76, 364
Minnesota.....	1, 137	603	534	2, 640	1, 985	655	63, 086	16, 861	35, 523
Mississippi.....	16, 588	16, 388	200	14, 866	14, 843	23	320, 374	156, 689	152, 974
Missouri.....	12, 791	11, 302	1, 489	7, 067	5, 940	1, 127	172, 170	63, 527	99, 882
Montana.....	49	21	28	72	59	13	2, 991	1, 422	1, 295
Nebraska.....	581	374	207	536	439	97	21, 793	5, 347	11, 872
Nevada.....	94	73	21	62	60	2	2, 478	1, 258	1, 182
New Hampshire.....	207	155	52	509	456	53	9, 354	2, 869	5, 648
New Jersey.....	10, 281	8, 167	2, 114	11, 427	10, 437	990	272, 375	69, 299	177, 154
New Mexico.....	844	769	75	788	753	35	23, 127	10, 418	12, 190
New York.....	9, 273	7, 528	1, 745	14, 352	13, 701	651	420, 784	145, 280	247, 404
North Carolina.....	22, 430	19, 044	3, 386	25, 140	24, 514	626	833, 199	420, 962	404, 474
North Dakota ⁴	10, 350	6, 987	⁵ 3, 363	13, 290	11, 727	⁵ 1, 563	268, 437	97, 635	152, 605
Ohio.....	4, 815	4, 127	688	3, 967	3, 842	125	130, 404	64, 740	61, 155
Oklahoma.....	962	696	266	1, 430	1, 328	102	34, 309	11, 870	18, 809
Oregon.....	12, 068	10, 927	1, 141	17, 092	15, 012	2, 080	441, 112	164, 008	230, 893
Pennsylvania.....	634	493	141	1, 260	1, 063	197	23, 169	8, 234	11, 468
Rhode Island.....	21, 332	20, 403	929	6, 476	6, 365	111	195, 752	104, 429	84, 781
South Carolina.....	12, 222	9, 640	2, 582	11, 947	10, 723	1, 224	304, 954	147, 304	125, 302
Tennessee.....	22, 025	15, 905	6, 120	20, 612	18, 654	1, 958	567, 207	228, 586	293, 006
Texas.....	424	218	206	247	203	44	15, 063	6, 250	7, 736
Vermont ⁴	12, 075	10, 813	1, 262	11, 144	10, 862	282	322, 201	163, 608	151, 984
Virginia.....	2, 092	1, 252	840	2, 150	1, 883	267	78, 226	28, 061	37, 392
Washington.....	7, 124	5, 747	1, 377	5, 573	5, 144	429	181, 164	82, 475	88, 550
West Virginia.....	1, 408	984	424	2, 455	1, 485	970	65, 472	17, 833	36, 055
Wisconsin.....	50	34	16	21	17	4	583	217	303
Wyoming.....	⁵ 20, 167	⁵ 17, 435	⁵ 2, 732	⁵ 5, 350	⁵ 4, 463	⁵ 887	⁵ 256, 386	⁵ 108, 492	⁵ 102, 450
Puerto Rico.....	¹ 606	¹ 446	¹ 160	¹ 570	¹ 545	¹ 25	¹ 18, 418	¹ 8, 474	¹ 7, 602
Virgin Islands.....									

¹ Estimate based on 6 months.² Gonorrhea not reported.³ Estimate based on 7 months.⁴ No clinics reported.⁵ Estimate based on 8 months.

TABLE 3.—*Statistical summary of activities in the control of venereal diseases for the fiscal years 1939 and 1940*

	1940	1939
<i>Medical activities</i>		
A. Cases of venereal disease reported to State health departments:		
I. Syphilis.....	487,464	485,967
II. Gonorrhea.....	180,383	184,679
Total.....	667,847	670,646
B. Doses of arsphenamine distributed by State health departments.....	6,895,837	4,677,757
C. Clinics:		
I. Clinics reporting to State health departments.....	2,454	2,085
II. Report from clinics:		
a. New cases admitted.....	355,589	314,594
b. Treatments given.....	9,165,490	7,923,958
c. Doses of arsphenamine administered.....	3,719,880	3,166,342
<i>Educational activities</i>		
A. Publications:		
I. Requests for publications received by the Division.....	20,885	19,528
II. Publications distributed:		
a. By the Division to State health departments and others...	385,871	244,290
b. By State health departments.....	3,324,358	2,462,206
Total.....	3,710,259	2,706,496
III. Venereal disease publications issued by the Public Health Service Office.....	27	27
B. Number venereal disease publications sold by Government Printing Office.....	1,402,490	
C. Motion-picture films lent by the Division.....	628	118
D. Posters distributed, sets.....	960	103

TABLE 4.—*Report of cooperative clinic activities furnished through State health departments from 1919 to 1940*

Year	Number of clinics reporting	New cases admitted	Total treatments given	Cases discharged as arrested or cured	Treatments per new case admitted
1919.....	167	59,092	527,392	14,278	8.92
1920.....	353	126,131	1,576,542	34,215	12.50
1921.....	442	140,748	2,108,003	55,467	14.98
1922.....	541	141,279	2,045,232	60,169	14.48
1923.....	513	119,217	1,992,631	55,503	16.71
1924.....	504	118,023	2,147,087	51,658	18.19
1925.....	495	110,372	2,088,494	47,828	18.92
1926.....	416	100,776	1,881,380	44,329	18.67
1927.....	425	107,688	1,964,233	44,701	18.24
1928.....	451	110,756	2,174,832	49,487	19.64
1929.....	445	120,315	2,128,417	52,136	17.69
1930.....	477	127,978	2,547,162	55,592	19.90
1931.....	512	143,982	2,847,024	57,665	19.77
1932.....	533	150,906	2,979,730	64,645	19.75
1933.....	572	154,302	3,263,927	65,116	21.15
1934.....	616	129,293	3,085,401	55,905	23.86
1935.....	656	134,720	3,359,632	61,064	24.94
1936.....	713	126,271	3,344,257	63,566	26.48
1937.....	965	149,472	3,757,770	68,515	25.14
1938.....	1,122	197,303	5,177,827	78,042	26.24
1939.....	2,085	314,594	7,923,958	102,880	25.19
1940.....	2,454	355,589	9,165,490	(¹)	25.78

¹ Reports discontinued.

TABLE 5.—*Budgetary allocation of Federal funds appropriated under the venereal disease control act for the fiscal year 1940 (as of June 30, 1940)*

States	Total allotted	Total payments	Total budgeted ¹	Purpose for which budgeted							
				Administrative	Consultation and technical information	Public education	Case-finding and case-holding	Laboratory	Treatment facilities	Drugs	Training
Alabama.....	\$158,982	\$150,666.83	\$158,977.00	\$2,370.00	\$24,690.00	\$484.37	\$20,110.00	\$35,217.66	\$55,219.97	\$18,125.00	\$2,760.00
Alaska.....	5,020.00	5,020.00	5,020.00			220.00		1,500.00	3,300.00		
Arizona.....	18,213.00	18,213.00	18,461.01		100.00	400.00		1,600.00	6,675.00	7,436.01	
Arkansas.....	108,018	102,473.52	109,755.56	4,800.00	6,375.00		2,250.00	1,600.00	6,675.00		
California.....	167,637	167,637.00	172,517.66	5,843.89	21,212.60	3,760.00	23,550.09	18,724.56	25,683.41	24,622.50	
Colorado.....	32,083	32,083.00	41,383.00	1,800.00	1,770.00		15,586.91	2,880.00	61,653.24	47,500.00	14,081.02
Connecticut.....	41,288	41,288.00	43,252.44	1,800.00	4,220.00		1,620.00	1,000.00	18,910.00	14,883.00	
Delaware.....	8,933	8,933.00	8,940.70	800.00	1,600.00		7,260.00	1,000.00	18,432.11	4,047.33	
District of Columbia.....	35,886	35,886.00	46,580.20	4,706.62	22,707.72		2,202.50	1,282.50	6,666.66	7.70	
Florida.....	68,675	68,675.00	74,817.26	2,500.00	8,680.00	1,650.00		9,220.00	37,160.02	1,514.20	7,500.00
Georgia.....	154,402	154,402.00	172,219.52		5,103.28			29,515.00	77,934.66	54,519.25	1,856.20
Hawaii.....	13,145	13,145.00	14,454.07		5,043.92			29,515.00	77,934.66	4,057.43	600.00
Idaho.....	16,064	15,775.40	16,514.00	1,120.00	4,103.28	400.00	3,993.36	300.00		3,000.00	100.00
Illinois.....	215,386	210,432.78	223,260.20	7,000.00	51,841.20	350.00	480.00	8,520.00	1,800.00		
Indiana.....	108,284	99,834.10	103,784.20	1,350.00	4,500.00	17,132.60	46,701.70	39,256.20	61,328.50	15,840.00	
Iowa.....	79,170	79,170.00	82,312.00	4,000.00	13,530.00	9,080.00	20,284.92	23,322.58	29,406.70	14,577.00	5,610.00
Kansas.....	58,425	52,154.83	58,606.00	4,506.00	3,210.30	1,375.00	5,220.00	17,480.00	14,065.00	14,577.00	1,128.22
Kentucky.....	117,351	117,351.00	118,303.00	5,055.00	5,500.00	1,000.00	5,220.00	15,774.59	13,891.89	13,500.00	
Louisiana.....	103,479	103,479.00	119,570.76	5,400.00	3,962.50	1,000.00	7,053.50	24,180.00	45,514.50	30,000.00	
Maine.....	22,438	20,058.64	25,038.00		520.64	1,065.00	5,584.35	18,775.00	51,916.19	19,675.22	10,157.50
Maryland.....	68,957	68,957.00	84,506.82	4,500.00	4,075.00	1,550.00			18,510.00	4,942.36	
Massachusetts.....	109,916	109,916.00	120,789.16		4,075.00	1,550.00	14,282.76	4,854.50	33,144.56		22,100.00
Michigan.....	138,307	134,312.88	148,177.00	5,960.00	12,000.00	5,000.00	9,270.00	26,290.00	61,379.16		8,850.00
Minnesota.....	72,379	72,379.00	82,461.54	5,080.00	16,425.13	4,664.92	15,213.83	34,604.09	25,639.48	42,669.55	3,000.00
Mississippi.....	126,549	126,549.00	128,585.90	2,100.00	9,977.54	13,200.00	12,770.00	23,094.00	13,840.00	4,500.00	
Missouri.....	121,552	121,552.00	162,437.90	5,700.00	2,550.00	5,000.00	29,113.00	9,340.00	39,872.90	32,750.90	7,860.00
Montana.....	15,087	10,585.50	14,114.00	4,000.00	5,070.00	2,600.00	9,370.00	13,425.00	90,072.90	21,400.00	14,300.00
Nebraska.....	39,797	9,285.00	12,630.00	1,960.00	2,000.00				2,654.94	5,459.06	
Nevada.....	4,349	4,349.00	4,949.00	100.00	700.00		2,800.00		6,000.00	870.00	1,000.00
New Hampshire.....	14,402	14,402.00	15,551.80	4,526.16	2,120.00			750.00	1,398.00	2,000.00	
New Jersey.....	117,627	117,627.00	121,347.02	3,960.00	4,930.00	8,301.48	2,435.48	2,109.09	3,121.07		1,240.00
New Mexico.....	16,722	16,449.17	16,722.00	3,300.00	1,346.66	500.00	22,685.66	15,980.00	25,861.02	34,378.86	5,250.00
New York.....	297,399	286,376.47	309,239.00	6,900.00	24,382.00	5,220.00	86,575.00	100.00	5,790.92	5,684.42	
North Carolina.....	158,680	158,680.00	191,119.67		29,234.00			65,258.00	65,875.00	36,304.00	18,725.00
North Dakota.....	26,202	25,602.00	35,491.22	1,800.00	29,234.00		3,120.00	1,740.00	128,202.67	11,400.00	17,403.00
Ohio.....	194,497	194,497.00	199,901.00	5,700.00	38,455.00	7,014.22	1,320.00	3,975.00	14,850.00	1,052.00	6,300.00
						12,400.00		23,480.00	68,546.00	50,000.00	

TABLE 5.—*Budgetary allocation of Federal funds appropriated under the venereal disease control act for the fiscal year 1940 (as of June 30 1940)*—Continued

States	Total al- lotted	Total pay- ments	Total bud- geted ¹	Purpose for which budgeted							
				Administra- tive	Consultation and technical information	Public education	Case-finding and case-holding	Laboratory	Treatment facilities	Drugs	Training
Oklahoma	99,351	99,351.00	103,234.18	900.00	15,456.00		9,400.00	15,300.49	41,367.50	18,310.19	2,500.00
Oregon	29,430	29,430.00	30,860.00	4,395.00	4,144.32		3,610.00	4,550.00	8,090.48	5,870.20	
Pennsylvania	276,305	204,137.12	299,510.00	5,680.64	60,977.50	200.00	3,610.00	16,735.00	95,729.50	49,409.36	25,505.00
Rhode Island	19,343	19,343.00	21,120.67	3,830.00	790.67	1,500.00	44,073.00	9,700.00	1,400.00	5,000.00	
South Carolina	97,285	97,285.00	98,015.53	3,600.00	16,701.14		250.00	13,638.39	35,720.00	23,996.00	2,360.00
South Dakota	24,849	15,915.75	24,053.31	1,200.00	2,400.00			9,035.00	8,018.31	3,000.00	400.00
Tennessee	131,328	127,095.98	147,008.00	4,545.00	4,740.00		2,940.00	22,645.00	77,088.00	34,190.00	900.00
Texas	244,402	244,402.00	294,124.18	4,500.00	21,315.54	2,516.65	40,921.69	32,511.50	134,257.80	43,484.00	14,617.00
Utah	17,212	17,212.00	18,124.75	900.00	4,725.00			1,080.00		9,905.00	1,514.75
Vermont	11,184	11,184.00	16,365.30	3,500.00	3,470.30				3,500.00	5,895.00	
Virginia	106,397	106,397.00	107,148.77	6,000.00	21,520.00			7,700.00	45,092.00	26,836.77	
Washington	45,674	45,674.00	60,521.41	3,000.00	3,230.41	3,600.00	8,831.00	10,590.00	16,020.00	12,000.00	3,250.00
West Virginia	60,091	43,925.34	68,425.59	1,900.00	4,261.67	2,675.00	555.00	16,559.59	15,364.33	27,380.00	4,730.00
Wisconsin	77,791	77,791.00	90,549.92	5,220.00	9,620.00	12,061.00	6,000.00	7,820.00	29,828.92	20,000.00	
Wyoming	6,938	4,690.00	4,690.00						4,090.00		
Puerto Rico	74,453	74,453.00	75,898.56	4,899.98	4,274.66	1,000.00	17,470.50	4,425.50	43,592.84	235.08	
Virgin Islands	1,926	1,926.00	1,926.00		226.00			4,400.00		1,300.00	
Total	4,379,250	4,188,399.31	4,723,365.78	165,308.29	517,429.70	131,220.24	526,664.74	655,431.24	1,698,999.25	817,564.63	210,747.49

¹ Differences between amounts budgeted and amounts allotted and paid due to inoperation of certain activities for full periods of budget, and to the budgeting of unexpended funds for fiscal year 1939.

TABLE 6.—*Domestic sales of arsenical drugs, estimated in number of doses, during the calendar years 1933 to 1939, inclusive, as reported by manufacturers and distributors*

Calendar year	Number of doses of arsenical drugs ¹	Calendar year	Number of doses of arsenical drugs ¹
1933.....	5,787,278	1937.....	9,808,272
1934.....	6,769,338	1938.....	10,656,253
1935.....	6,521,312	1939.....	12,390,837
1936.....	7,717,953		

¹ Estimated on basis of 0.3 gm. average dose of arsphenamine (salvarsan); 0.2 gm. average dose of silver arsphenamine, sulfarsphenamine, neosilverarsphenamine, etc., 0.5 gm. average dose of neoarsphenamine; and 0.05 gm. average dose of mapharsen.

TABLE 7.—*Report of the U. S. Public Health Service clinic at Hot Springs National Park, Ark., from July 1, 1939, to June 30, 1940 ¹*

Total applicants.....	4662	Total treatments given.....	132,852
Venereal ²	2290	Arsphenamine.....	16,305
Nonvenereal.....	2194	Heavy metal.....	32,866
Did not return ³	178	Other intravenous.....	1,907
Syphilis.....	1702	Gonorrhea.....	20,678
New cases.....	1233	Baths.....	61,096
Readmitted cases.....	279	Laboratory examinations.....	86,533
Rejected.....	190	Complement fixation tests.....	14,755
Gonorrhea.....	685	Precipitation tests.....	14,755
New cases.....	612	Kahn quantitative precipitation.....	7,931
Readmitted cases.....	70	Kahn presumptive tests.....	1,565
Rejected.....	3	Icterus indices.....	20,843
Syphilis (new cases).....	1233	Darkfields.....	445
Primary.....	105	Gonococcus smears.....	15,790
Secondary.....	253	Urine analyses.....	9,392
Tertiary.....	791	Frei tests.....	280
Neuro.....	60	Chancroid tests.....	170
Congenital.....	24	GC culture.....	219
Gonorrhea (new cases).....	612	Special tests.....	388
Acute.....	502	Spinal fluid examinations.....	942
Chronic.....	110	At Public Health Service Medical Center.....	907
		At Levi Hospital.....	35

¹ From the annual report of the clinic.

² Represents 2,473 cases of venereal disease, i. e., 183 patients with 2 or more infections.

³ Did not return for physical examination.

TABLE 8.—*Report of the U. S. Public Health Service clinic at Hot Springs National Park, Ark., from July 1, 1922, to June 30, 1940*

Year	Number of applicants	Number of cases			Treatments given ¹
		Total venereal disease patients	Syphilis	Gonorrhea	
Total.....	105,049	74,844	48,959	26,387	1,615,442
1922.....	2,720	1,775	1,182	593	43,830
1923.....	3,389	1,854	1,326	528	41,559
1924.....	3,676	2,186	1,447	739	50,683
1925.....	3,411	2,782	2,011	771	50,608
1926.....	3,570	3,064	2,211	853	54,590
1927.....	4,757	3,682	2,504	1,178	58,489
1928.....	5,467	4,134	2,626	1,508	72,466
1929.....	5,265	3,986	2,512	1,474	75,519
1930.....	5,704	4,441	2,743	1,698	79,180
1931.....	4,881	5,088	2,776	2,312	66,246
1932.....	5,106	6,184	3,188	2,996	93,707
1933.....	4,036	4,485	2,850	1,635	73,466
1934.....	6,682	5,607	3,330	2,277	124,004
1935.....	14,946	8,032	5,272	2,760	198,051
1936.....	8,490	4,630	3,368	1,262	141,446
1937.....	6,806	4,217	2,974	1,243	110,336
1938.....	6,209	3,664	2,863	1,078	108,337
1939.....	5,272	2,743	2,074	797	101,169
1940.....	4,662	2,290	1,702	685	71,756

¹ Baths not included.

DIVISION OF MENTAL HYGIENE

Assistant Surgeon General LAWRENCE KOLB in charge

The functions of the Division of Mental Hygiene continued unchanged during the fiscal year ending June 30, 1940.

STUDIES OF THE NATURE AND TREATMENT OF DRUG ADDICTION

Studies of the nature and treatment of drug addiction were continued at the United States Public Health Service Hospital, Lexington, Ky. The research activities were strengthened and extended during the year by reorganization and the appointment of a Director of Research through whom all the research activities at the hospital are coordinated.

Follow-up studies of addiction, withdrawal, and the first 9 months of convalescence, were continued on 10 additional patients. These studies will be completed within the next year.

Studies of the addiction characteristics of members of the morphine series, through their substitution for morphine in the treatment of addicts, have been continued and extended. Substitution studies of alpha-isomorphine, dihydro-alpha-isomorphine, isocodeine, dihydro-isocodeine and dihydrocodeine were completed. The results at the present time indicate: (1) Saturation of the unsaturated double bond between carbons No. 7 and 8 in the morphine molecule increases potency and prolongs physical dependence action, (2) spatial shifts of the alcoholic hydroxyl result in unpredictable changes on physical dependence action, (3) replacement of alcoholic hydroxyl by hydrogen increases the power but shortens the duration of physical dependence action, (4) and methylation of the phenolic hydroxyl decreases the power but prolongs the physical dependence action. Studies of additional members of the morphine-codeine series will be continued.

A study of the effects of thiamine on the morphine abstinence syndrome indicated that this vitamin does not significantly affect the withdrawal syndrome. Studies of the effects of certain sympathomimetic amines and of vitamin B-6 on the abstinence syndrome are being made. Studies are being made of the influence of "Prostigmin" on the addiction liability and the analgetic effectiveness of morphine. Studies have been continued on the effects of small doses of morphine, codeine, heroin, and synthetic analgetics on abstinence syndromes of mild or moderate intensity. The results indicate measurable reductions in abstinence syndrome intensity by members of the morphine series, but no significant deviation from normal expectancy by other preparations. The results are sufficiently self-consistent to be predictable. After further study this technique may yield a quicker method for investigation of addiction qualities of members of the morphine-codeine series.

Studies of reduction withdrawal treatments indicate that the following procedure has advantages over those previously reported: Preliminary stabilization on morphine (four minimally effective doses

per day) for a period adequate for a careful study of the patient, followed by the administration for from 3 to 5 days of progressively smaller amounts of morphine at one-third the stabilization dose frequency.

Studies of addiction and withdrawal point to significant involvement of the autonomic division of the nervous system, possibly through effects on the hypothalamus. Studies of the effect of a standard cold stimulus on the blood pressure of addicts during addiction, withdrawal and convalescence, indicate abnormal responses during addiction and withdrawal with a gradual recovery to normal within one year or less. Since the autonomic nerves may be affected per se, studies are being made of the serum cholinesterase content of addicts during addiction, withdrawal, and convalescence.

An intensive study of the several sequential stages of addiction and recovery, which was started on April 4, 1938, was terminated May 31, 1940. The data obtained from biochemical, physiological, and psychological studies are being analyzed and correlated and will form the subject of a comprehensive report at a later date. The finding of blood hydration during addiction, a temporary relative concentration during withdrawal, and a return to normal concentration within a year indicated the advisability of extension of studies of the economy of body water. Accordingly, measurements of blood volume and of extracellular water have been undertaken in conjunction with additional studies of blood concentration.

Significant progress was made in studies of the excretion of morphine in the urine of morphine addicts. It was learned that morphine is excreted in two forms—namely, *free* and *bound*. Vigorous acid hydrolysis is required to liberate and identify free morphine from the conjugated morphine. About 25 percent of administered morphine is excreted in the bound form and about 5 percent in the free form. Studies having as their object the elucidation of the nature of the product with which morphine is conjugated and the position in the morphine molecule at which conjugation takes place are in progress. These studies suggest that the presence of a free phenolic hydroxyl group is necessary for conjugation to take place.

Electroencephalographic studies made on patients during addiction and following withdrawal for a year or more showed that the alpha index (the percentage of time alpha activity is present) of patients in these two groups differ from each other and from normal standards. Studies of the effects of members of the morphine-codeine series which have been substituted for morphine show that some of these substances significantly alter the brain potentials. No significant correlations have been found between the electroencephalogram of withdrawal and the various physiological changes which occur during this period. The results of electroencephalography to date suggest that the primary action of morphine is not upon the cerebral cortex.

Studies of the analgetic effectiveness of various members of the morphine-codeine series are being carried out by means of an apparatus similar to that developed by Drs. Hardy and Wolff at the Cornell Medical Center, New York City. The results of studies of the analgetic action of members of the morphine-codeine series will be correlated with those of the physical dependence action of these same drugs in an attempt to quantify the addiction liabilities

of a group of drugs on the basis of the likelihood of addiction developing from their use in the practice of medicine.

Studies are being carried out to determine whether or not a psychological test or a combination of tests may provide a basis for differentiation of addicts from nonaddicts. Studies of the intelligence of addicts have indicated no significant deviation from that of nonaddicts. Studies of body build suggest that the addict is normal in this respect. Studies being made on addicts in the several stages of addiction and recovery continue to show impairment of mental efficiency, decreased skin conductance and decreased galvanic skin reflex response to word stimuli during active addiction. It was found that when morphine is introduced intravenously, in small amounts at a very slow rate, definite and measurable physiological changes occur prior to the recognition of narcotic effects regardless of previous experience. Plans have been completed to include the Rorschach test in the psychological studies.

Investigative work was continued during the year on methyldihydromorphinone at the Marine Hospital, Baltimore, Md., Walter Reed Hospital, Washington, D. C., and at certain other hospitals under the jurisdiction of the Massachusetts Health Department, in addition to the studies made at the United States Public Health Service Hospital, Lexington, Ky. This substance appeared to be very promising as a pain-relieving, nonaddicting drug when first discovered, but after reviewing the status of these studies it was the consensus that this drug did not come up to the original expectations and could not be recommended by the Public Health Service or the National Research Council as the ideal drug to replace morphine. It was therefore decided to discontinue the study of this substance at the end of June 1940. Methyldihydromorphinone has been used by clinicians in surgery and pre-operative and post-operative medication in general hospitals. It has been found to have some advantages over morphine and is apparently less habit-forming but its cost and difficulty of manufacture make it unsatisfactory as a replacement drug for morphine.

DISSEMINATION OF INFORMATION

Reports of the results of studies on drug addiction were presented before the Federation of American Societies for Experimental Biology in New Orleans and before the American Psychiatric Association in Cincinnati. Talks on the subject were given before interested groups in various sections of the country, and the following articles relating to the work of the Division on drug addiction were published in Service as well as outside publications: Rehabilitation of Drug Addicts, by W. F. Ossenfort; The Narcotic Addict: His Treatment, by Lawrence Kolb; The Treatment of Drug Addicts at the United States Public Health Service Hospital, Fort Worth, Tex., by W. F. Ossenfort; The Narcotic Addict Before the Court, by J. D. Reichard; Studies on Codeine Addiction, by C. K. Himmelsbach, H. L. Andrews, R. H. Felix, F. W. Oberst and L. F. Davenport; Some Aspects of the Problem of Drug Addiction As It Exists in the United States, by W. F. Ossenfort; The Kolb Classification of Drug Addicts, by M. J. Pescor; Blood Concentration in Morphine Addicts, by E. G. Williams; The Comparative Mental Efficiency of a Drug

Addict Group, by J. E. Partington; The Order of Certain Psycho-Physiological Events Following the Intravenous Injection of Morphine, by R. R. Brown; Some Comments on the Psychopathology of Drug Addiction, by R. H. Felix; and The Personality of Drug Addicts, by Lawrence Kolb.

STUDIES OF THE ABUSIVE USES OF AND THE MEDICINAL AND SCIENTIFIC NEEDS FOR NARCOTIC DRUGS

Owing to the unsettled world conditions a review was made of the opium resources available to this country in the event of a possible emergency that would cut off foreign supplies.

From a survey of the stocks on hand including the reserve supplies it was ascertained that there is on hand a sufficient quantity of morphine and opium to meet the needs of the country for about 3 years. The United States imports opium chiefly from Yugoslavia and Turkey, but Persia, Afghanistan, and India produce opium that can be used if necessary. It appears from the data reviewed that the opium situation is well taken care of and there is very little danger of an emergency affecting necessary supplies.

HOSPITALS FOR DRUG ADDICTS

UNITED STATES PUBLIC HEALTH SERVICE HOSPITAL, LEXINGTON, KY.

Besides the special research activities on the nature and treatment of drug addiction conducted at the Lexington Hospital, the institution continued its regular functions of the reception, general care, study, treatment, and disposition of patients; the operation of occupational therapy projects, including agricultural and mechanical activities, and garment manufacturing, etc., as well as the maintenance of the physical plants.

It is felt that the rehabilitation of drug addicts depends to a large extent on vocational training and rehabilitation, and equipment of the patient for financial independence and self-support before he leaves the institution. Much emphasis, therefore, has been placed on the matter of vocational assignments. A board was created to handle this matter, and it is believed that much progress has been made towards the proper placement of patients with reference to (1) successful adjustment after discharge, (2) the patient's individual abilities and needs, and (3) the requirements of the institution. This vocational board has incidentally been extremely valuable in giving administrative heads an understanding of the needs of other departments and of the institution as a whole. Many patients who are physically and mentally able to cooperate in the normal rehabilitation program of the institution need an opportunity to indulge in some type of hobby. To fill this need a hobby shop has been opened, in which patients in their spare time make articles for their own use and enjoyment. It is strictly an avocational activity, entirely voluntary, and gives patients the opportunity to follow some interest or activity with a minimum of supervision.

The practice of granting leaves of absence to voluntary patients has been extended, and has proved a useful procedure, as it allows these patients to make an attempt at readjustment in a less restricted environment than the institution affords. It thus gives the patient's physician an opportunity to evaluate the results of treatment and to some extent to modify future treatment. If this procedure could be

extended to other types of patients it would be extremely useful therapeutically.

The use of the stratification system in dormitory assignments has been continued. This has a very salutary effect because it gives definite rewards for the improvement of a patient's adjustment, as well as placing patients in their own cultural and ethical level, thereby creating an optimum environment for adjustment and treatment.

Custody has been made as unobtrusive as possible. It was found that great relaxation in regulations could be effected without any loss of control of patients; in fact, the opposite effect was experienced. At the close of the fiscal year, 45 percent of the patients were under minimum custody (trusties), and the percentage under close custody was only 6.38 percent. Friendliness between patients and personnel was encouraged, and the esprit de corps of the custodial force was strengthened. The policy was adopted of treating patients as patients if their behavior permitted it, and as prisoners only when their behavior made such action absolutely necessary.

During the year 27 patients were discharged by parole, and no parole violators were returned. During the previous fiscal year parole was granted to only 10 patients, and 2 were returned as violators. Of the 447 patients discharged by conditional release, 47 were returned for violating the conditions of their release. This compares very favorably with the preceding year, during which 409 patients were discharged by conditional release, and 87 were returned.

There has been a slight decrease in the proportion of probationer patients sent to the hospital by the courts, in spite of the fact that this is considered a desirable method of handling certain types of convicted addicts.

The treatment of voluntary patients remains far from satisfactory, because so many leave before the treatment is completed. Only 15 percent of the voluntary patients discharged during the year had remained for the time considered proper by the hospital authorities.

There was one elopement during the year. This was found to be a patient who wandered away in a state of confusion. He made no real attempt to escape from the vicinity of the hospital and was apprehended and returned.

The follow-up study of discharged patients has been continued. The last check-up made in December 1939, of the data as of July 1, 1939, showed that of all patients discharged since the opening of the institution, numbering 3,002, 32.81 percent had not relapsed to the use of drugs, 39.81 percent had relapsed, the whereabouts of 23.12 percent was unknown, and 4.24 percent were dead or in the hospital because of incurable disease. These studies do not include patients transferred to other institutions and those released to the immigration authorities for deportation.

The maintenance department in caring for the plant, including equipment and grounds, has offered an excellent opportunity for vocational training for a large group of patients. The maintenance shop building has been completed and occupied, two cottages and one farm building authorized as a station project have been completed, the station roadways have been repaired and oiled, and additional portions of the grounds have been landscaped. The industries operated under the working capital fund also provided facilities and opportunities for a program of vocational rehabilitation of patients.

The new building program begun in the latter part of the year is progressing rapidly. This includes new dormitory facilities for male patients, a women's building, a nurses' home, and quarters for medical officers.

UNITED STATES PUBLIC HEALTH SERVICE HOSPITAL, FORT WORTH, TEX.

The program of the Fort Worth Hospital has been very closely coordinated with that of the Lexington Hospital.

About 80 percent of the patients of this hospital have trusty status. As at the Lexington Hospital the general atmosphere of the patient body as a whole seems to reflect the wisdom of having an institution operated with a minimum of emphasis on custodial features. During the year only three patients took advantage of this program by leaving the hospital grounds without permission. Each of them was returned to the hospital within 8 hours of his departure. The general plan of the operation of the treatment facilities on the basis that the drug addict is an individual has been improved.

The greater use of the provision for granting furloughs to voluntary patients has been encouraging in the vast majority of instances. These patients seemed improved as a result of their wholesome adjustments during furlough. Some had to be discharged, however, for failure to return.

The establishment of a well-conducted musical program, the increased use of the library by patients, a fairly well coordinated program of maintenance and industrial activities including the manufacture of garments, and farm activities have continued as valuable adjuncts to the purely medical program.

Follow-up studies of former patients 6 months after discharge from the hospital indicate that about 40 percent of the patients are making a satisfactory social adjustment without drugs. In some of these cases this was made possible through the establishment of a wholesome post-institutional program prior to discharge.

The primary construction program was completed during the year to a point where the intended capacity of 1,000 beds was established. Six sets of quarters for commissioned officers and 7 sets of quarters for noncommissioned officers were completed and are now occupied. The remodeling of one of the wards into an adequate facility for the treatment of disturbed cases has been completed and meets in a very practical way a need which had not been foreseen. Certain minor construction changes and additions including an enlarged implement storage shed and garages for personnel living on the station have helped materially.

A good start has been made on the landscaping program. The 7-acre area of the reservation immediately adjacent to the principal buildings has been remarkably improved by the establishment of a Bermuda lawn, the setting out of shrubbery and the planting of over 400 trees in accordance with a plan developed by the Landscaping Division of the Public Buildings Administration.

The industries carried on at this hospital under the working capital fund have afforded a satisfactory means of occupational therapy in the treatment and rehabilitation of patients.

A statistical summary of the movement of patients during the year follows:

Statistical summary of patient movement at the U. S. Public Health Service hospitals, Lexington, Ky., and Fort Worth, Tex., for the fiscal year 1940

	Lexington	Fort Worth
Population June 30, 1939.....	1,030	295
ADMITTED DURING FISCAL YEAR 1940		
Prisoners:		
Received direct from United States district courts.....	376	125
Received by transfer from Federal prisons.....	102	443
Parole violators returned.....	0	2
Conditional release violators returned.....	47	10
Returned from escape.....	1	3
Returned from writ.....	0	5
Held for United States marshal awaiting trial.....	8	2
	534	590
Probationers received direct from United States courts.....	134	23
Voluntary patients.....	277	226
Ex-prisoner Patients.....	3	0
Total admissions.....	948	839
Grand total.....	1,978	1,134
DISCHARGED DURING FISCAL YEAR 1940		
Prisoners, cured:		
On parole, prognosis good.....	27	17
On parole, prognosis guarded.....	0	3
On conditional release, prognosis good.....	88	7
On conditional release, prognosis guarded.....	325	79
On conditional release, prognosis poor.....	34	53
Short term expiration (old law) prognosis guarded.....	2	1
Sentence reduced to expire forthwith, prognosis guarded.....	1	0
Reconditional release, prognosis guarded.....	1	0
Prisoners, improved:		
Full term expiration, prognosis poor.....	68	11
Transferred to Federal penal institutions.....	187	15
Death.....	7	6
To United States marshal for trial.....	7	1
Order United States court, writ of habeas corpus.....	0	5
Escape.....	1	3
Status changed.....	0	1
	748	202
Probationers:		
Cured, prognosis good.....	21	8
Cured, prognosis guarded.....	84	7
Cured, prognosis poor.....	5	0
No longer an addict within the meaning of the law, improved.....	1	0
Surrendered to United States marshal, detriment to station, prognosis poor.....	0	1
Cured, surrendered to State authorities, prognosis good.....	1	0
Status changed to prisoner.....	0	2
	112	18
Voluntaries, cured:		
Prognosis good.....	12	23
Prognosis guarded.....	24	16
Prognosis poor.....	3	0
Voluntaries, maximum benefit:		
Prognosis guarded.....	1	7
Prognosis poor.....	0	3
Other voluntaries:		
Against medical advice, prognosis poor.....	199	151
Detriment to station.....	3	1
Death.....	3	1
Failure to return from leave of absence, prognosis poor.....	9	0
Not entitled to further treatment, prognosis poor.....	2	0
Not a proper charge of the Government.....	0	1
On leave of absence, improved.....	1	0
Granted leave to answer court summons, returned as prisoner.....	1	0
Ex-prisoner patients:	258	203
Cured, prognosis good.....	0	0
Cured, prognosis guarded.....	1	0
Against medical advice, improved.....	1	0
Death.....	2	0
	4	0
Total discharges.....	1,122	423
Population June 30, 1940.....	856	711
Average daily population for the fiscal year.....	1,014	410

MEDICAL AND PSYCHIATRIC SERVICES IN FEDERAL PENAL AND CORRECTIONAL INSTITUTIONS

The fiscal year 1940 marks the tenth consecutive year during which the Public Health Service furnished and supervised the medical, technical, and psychiatric services in Federal penal and correctional institutions under the jurisdiction of the Bureau of Prisons, in accordance with the act of May 15, 1930.

The medical service was extended to include the National Training School for Boys, Washington, D. C., effective July 1, 1939, the date on which that institution was transferred to the jurisdiction of the Bureau of Prisons. Two additional medical units were provided, one at the Federal Correctional Institution, Texarkana, Tex., and the other at the Federal Correctional Institution, Denver, Colo., effective June 27 and June 29, 1940, respectively, when the chief medical officers reported for duty at the respective institutions, preliminary to their opening for the reception of inmates. Personnel was being assembled and trained to staff medical units at four newly constructed institutions as follows: The Federal Penitentiary, Terre Haute, Ind., the Federal Correctional Institution, Danbury, Conn., the Federal Reformatory for Women, Dallas, Tex., and the Federal Correctional Institution, Ashland, Ky. These institutions will open for operation early in the coming fiscal year.

At the close of the fiscal year 1940 the Service was operating a total of 25 independent units which provide complete medical service for 27 institutions, classified as follows:

<i>Institution</i>	<i>Chief medical officer</i>
Penitentiaries (6) :	
Alcatraz, Calif.-----	Surgeon (R.) R. M. Ritchey.
Atlanta, Ga.-----	Passed Assistant Surgeon (R.) W. H. Matthews.
Fort Leavenworth, Kans.-----	Passed Assistant Surgeon J. W. Cronin.
Leavenworth, Kans.-----	Passed Assistant Surgeon J. W. Cronin.
Lewisburg, Pa.-----	Passed Assistant Surgeon E. C. Rinck.
McNeil Island, Wash.-----	Surgeon (R.) R. O. Settle.
Reformatories (5) :	
Alderson, W. Va. (women)-----	Acting Assistant Surgeon Edda von Bose.
Chillicothe, Ohio-----	Passed Assistant Surgeon J. L. Wilson.
El Reno, Okla.-----	Acting Assistant Surgeon W. K. Dyer.
Petersburg, Va.-----	Acting Assistant Surgeon C. I. Pirkle.
Washington, D. C. (National Training School for Boys).-----	Surgeon J. B. Ryon.
Correctional institutions (7) :	
Denver, Colo.-----	Acting Assistant Surgeon H. M. Janney.
La Tuna, Tex.-----	Acting Assistant Surgeon T. H. Smith.
Los Angeles, Calif.-----	Acting Assistant Surgeon George Hess.
Milan, Mich.-----	Acting Assistant Surgeon A. H. Smith.
Sandstone, Minn.-----	Passed Assistant Surgeon (R.) M. A. Ruona
Tallahassee, Fla.-----	Assistant Surgeon G. K. Massengill.
Texarkana, Tex.-----	Assistant Surgeon H. E. Wilson.
Detention headquarters (2) :	
New York, N. Y.-----	Assistant Surgeon J. L. James.
New Orleans, La.-----	Acting Assistant Surgeon B. L. Newell.
Prison camps (6) :	
Dupont, Wash.-----	Served from McNeil Island.
Kooskia, Idaho-----	Acting Assistant Surgeon J. M. Verberkmoes.
Mill Point, W. Va.-----	Acting Assistant Surgeon K. J. Hamrick.
Montgomery, Ala.-----	Acting Assistant Surgeon D. N. Rappoport.
Springfield, Mo.-----	Served from Medical Center.
Tucson, Ariz.-----	Acting Assistant Surgeon H. E. Thompson.
Hospital (1) :	
Medical Center, Springfield, Mo.-----	Senior Surgeon M. R. King.

Efforts were continued during the fiscal year 1940 to build up in the Federal penal and correctional institutions the most efficient medical service for inmates that reasonably can be attained.

The physical plants at many institution hospitals were in a transitional stage, undergoing extensive alterations to transform them from archaic or inadequate, to modern, efficient units calculated to give

the best returns on investments in equipment, supplies, and personnel. Thus, the hospitals at Atlanta, Alcatraz, McNeil Island, El Reno, La Tuna, Los Angeles, Milan, Sandstone, and the National Training School for Boys were all being extensively rearranged or enlarged to increase bed capacity and out-patient department efficiency, and the hospitals at Leavenworth, Petersburg, Tucson, Dupont, Montgomery, and Mill Point were being entirely rebuilt. The new 304-bed addition to the facilities of the Medical Center, Springfield, Mo., was completed and ready for occupancy at the close of the fiscal year. The Medical Center was also engaged in developing a new central serological and physiological chemistry laboratory which will serve the entire prison system, a deep therapy X-ray laboratory, a physiological chemistry research laboratory, an electroencephalographic laboratory, and a photographic laboratory for psychopathological research. Preparations were being made to add two new industrial units to the occupational therapy facilities at Springfield: One, an orthopedic shop for the fabrication of artificial limbs and simple braces, will serve the entire Federal penal and correctional system; the other, a fiber furniture shop, will provide interesting, instructive, and gainful occupation for many of the patients in the new 304-bed unit referred to above.

Medical staffs likewise have been passing through a transitional period. This has been largely due to the necessity for preparing for the opening of 6 new institutions and the material enlargement of the medical facilities at 10 others, as well as the absorption of the last 10 of the 30 regular commissioned officers provided for by the appropriation acts of the Justice Department and Federal Security Agency. A program of intensive training of medical personnel was, therefore, inaugurated. The most important course was given at the Medical Center for Federal Prisoners, Springfield, Mo., where results were so gratifying that it is planned to continue the program with at least one 3-month course during each fiscal year. It was necessary to transfer an unusually large number of medical officers in order that the staffs organized for the new institutions might be seasoned in prison practice and ready to carry on efficiently.

While these construction and personnel factors were not permitted at any institution to interfere with the established standard of routine medical treatment and practice, they did curtail unusual and research projects. For instance, only the following list of published articles originated in the Federal penal and correctional medical service: *Disciplining the Psychopath*, by J. K. Fuller; *Results of Insulin Shock Therapy in Ten Cases*, by Stellner and Watson; *the Destiny of the Psychopathic Criminal*, by C. W. Mangum; *Case Report of Xanthoma Granulomata*, by A. R. Dahlgren; and *Public Health Resources Available to the Probation Officer*, by J. K. Fuller.

Cooperation between Bureau of Prisons personnel and Public Health Service personnel was excellent everywhere.

The success of any program involving rehabilitation can be gaged by the closeness of contact between the therapist and the group being treated. Every facility was provided at every institution in the Federal penal and correctional system, to promote the ready contact of inmates with medical staffs.

The established routine for carrying out the medical program for prisoners was continued during the year. The process of "condition-

ing" inmates begins with the 30-day "admission quarantine period" during which thorough physical and mental examinations are made. This part of the program is predicated on the proposition that good physical and mental health tends to promote better or more adequate mental adjustment. The examinations conducted during the admission quarantine period are calculated to determine the presence of any contraband in or about the body, contagious or infectious diseases, or disabling physical or mental disease or condition. These examinations are very complete, and routinely include inspection for vermin, injuries, etc., general physical examination, specialists' examinations of the eye, ear, nose, and throat, refraction of the eyes, urological examination, X-ray of chest if indicated, dental examination, and psychometric and psychiatric examinations.

A program of treatment is laid out as a result of these examinations. Prophylactic measures include the elimination of any foci of infection in the teeth, throat, nose, or elsewhere, and inoculation against typhoid and vaccination against smallpox. Eyeglasses are provided if indicated. Reasonable dental, orthopedic, and prosthetic appliances are provided. The best possible treatment is given for every pathological condition found. Advice is given regarding classification, including work assignments, custodial status, transfer, diet, housing, etc.

Medical advice was freely sought by inmates. Comparatively few malingerers were uncovered. The number of these has been steadily decreasing through the past several years. Inmates seldom attempt, any more, to take unfair advantage of an honest, skillful, efficient medical staff.

The psychiatric service has seen a remarkable evolution in the Federal penal and correctional service during the past decade: where once the average inmate scorned the services of a psychiatrist, he now seeks him out so enthusiastically, and profits so well in better cooperation and more favorable attitude toward his problems and society by these contacts, that one, two, or even three psychiatrists now occupy exceedingly fruitful posts at every Federal penal and correctional institution, except the camps.

A vexing and ever present problem of the psychiatrist is how best to apportion his time between numerous research and routine activities, scores of special "problem" individuals, and hundreds of "run of the mill" prisoners, who, by the very fact of incarceration, merit psychiatric attention. The number of psychiatrists that would be needed to adequately meet the demands of this situation far exceeds the number that it is possible to employ. The most hopeful solution of the problem seems to lie in some form of group therapy and several institutions inaugurated such programs, thus reaching many inmates in need of help, information, or advice, who otherwise could not have been contacted with any hope of therapeutic success.

Table 2 indicates the extent to which inmates take advantage of their opportunities to contact the medical staff. Considering that this table reflects only voluntary, spontaneous visits by inmates, and that a very large proportion of the total inmate population enjoys excellent physical health and therefore seldom feels the need for medical advice, an average monthly contact with more than 60 percent of the population is a very encouraging indication of the value of the medical program.

Sanitary inspections of the institutions were made at frequent periodic intervals by chief medical officers.

The program of giving a complete annual physical examination to all Bureau of Prisons field employees was continued during the year. These examinations are very definite protection against the hazards that are always attendant upon physical or mental disease in custodial employees.

During the year, psychiatrists participated actively in the regional training schools for custodial officers and various studies were continued in order to estimate the personality qualifications of custodial officers.

A further indication of the scope of the medical services rendered during the fiscal year, and of the steady growth of the service during the past years, is given in the accompanying tables and graphs:

TABLE 1.—*U. S. Public Health Service work in Federal penal and correctional institutions, by fiscal years ending June 30, 1935, to 1940 (rates)*

Item	1935	1936	1937	1938	1939	1940
Treatments, per inmate ¹	30.1	28.9	28.8	36.4	38.5	37.6
Expenditures for health services per inmate ¹	16.5	16.3	16.0	18.3	20.0	23.5
Personnel (Public Health Service) (average) per 1,000 inmates ¹	9.0	8.7	9.1	10.2	10.3	10.9
Examinations per inmate ¹	5.2	5.2	5.3	6.5	4.9	4.6
Deaths in institution per 1,000 inmates ¹	3.3	3.5	3.0	2.9	2.8	2.6
Average number of hospitalized inmates per 100 of total inmates ²	6.3	6.2	6.6	6.6	7.0	7.4

¹ Rates based upon total number of inmates in institution during year, that is, the sum of the inmate population at the beginning of the year plus the number received during the year.

² Average number of inmates in hospital per 100 inmates in average total institution population.

TABLE 2.—*U. S. Public Health Service: Statistics of out-patient medical services in Federal penal and correctional institutions, fiscal year 1940*

(Based upon reports furnished to the U. S. Public Health Service by medical departments of the Federal penal and correctional institutions)

	July	August	September	October	November	December	January	February	March	April	May	June
1. Individual inmates who reported to sick line during the month	11,437	10,959	10,670	11,519	12,738	12,046	12,570	12,277	12,499	12,549	12,839	12,884
2. Number of times individual inmates (listed under 1) reported to sick line during the month	61,139	62,009	58,188	64,420	60,776	62,308	67,294	66,270	67,906	67,040	69,112	66,644
3. Number of treatments given, in all out-patient clinics, to inmates reporting to sick line during month ¹	95,674	98,185	94,141	102,464	98,872	95,989	106,372	101,703	102,032	99,103	100,026	96,174
4. Percentage of total inmates handled who reported to sick line during month	57.3	57.3	57.0	59.5	64.3	59.6	63.5	62.6	63.3	63.7	63.4	63.9
5. Population at beginning of each month	19,024	18,482	17,824	17,504	18,219	18,748	18,843	18,669	18,361	18,383	18,366	18,879
6. Court commitments during each month	944	645	887	1,850	1,586	1,466	960	950	1,397	1,321	1,876	1,281
Total ²	19,968	19,127	18,711	19,354	19,805	20,214	19,803	19,619	19,758	19,704	20,242	20,160

¹ The above figures do not include treatments given "in-patients" treated in "out-patient" departments.

² The total number of inmates handled during the year was 34,187.

TABLE 3.—U. S. Public Service personnel, treatments, examinations, hospitalization, fiscal year

(Based upon reports furnished the U. S. Public Health Service by

Item	Total	Penitentiaries						Reformatories			
		Alcatraz, Calif.	Atlanta, Ga.	Fort Leavenworth, Kans.	Leavenworth, Kans.	Lewisburg, Pa.	McNeil Island, Wash. ¹	Chillicothe, Ohio	El Reno, Okla.	Petersburg, Va.	Alderson, W. Va.
Personnel (July 1, 1940):											
Medical officers—full time	65	2	5	4	6	5	4	5	3	2	2
Medical officers—part time	83	1	4	2	5	10	4	5	4	3	4
Dental officers—full time	22	1	1	1	2	2	1	2	1	1	1
Dental officers—part time	6										
All other Public Health Service	223	7	5	5	7	7	2	7	6	3	6
Total Public Health Service	399	11	15	12	20	24	11	19	14	9	13
Inmate personnel (average)	627	3	86	108	138	61	39	29	30	17	22
Hospital bed capacity (normal)	1,880	23	148	150	191	84	85	73	66	41	57
Average daily institution population	18,685	284	3,117	1,173	2,962	1,630	1,053	1,407	1,134	835	555
Average daily hospital population	1,382.9	14.6	90.6	94.8	118.2	49.9	68.2	37.7	25.8	35.0	56.4
Surgical operations	11,209	21	1,894	672	1,487	1,594	621	907	429	341	34
Hospital relief-days	506,092	5,337	33,149	34,691	43,254	18,267	24,948	13,798	9,438	12,814	20,645
Deaths	90		9	6	11	2	6	2	1	5	5
Out-patient departments:											
Treatments:											
Medical	611,859	17,862	56,482	15,865	62,548	5,890	60,579	86,868	33,661	42,463	27,219
Surgical	84,790	1,457	12,578	5,492	2,352	11,729	5,470	6,769	5,864	2,854	1,299
Urological	198,460	811	23,675	6,388	20,507	18,468	4,974	9,248	11,931	18,812	29,333
Eye, ear, nose, and throat	101,956	2,175	4,978	7,702	11,369	23,885	2,879	6,362	1,875	3,140	5,371
Dental	157,027	1,421	19,431	7,529	19,229	11,085	11,322	14,698	13,829	13,198	3,655
Psychiatric	22,109	3,963	2,164	428	707	3,838	1,255	1,373	1,478		836
Psychological	10,174	86	543	562	1,879	2,376		1,996	2,632		
Physiotherapy	99,279	3,385	6,277	7,834	9,100	6,907	2,829	5,637	2,968	5,930	139
X-ray	405		71		34			30		47	
Total	1,286,059	31,160	126,199	51,800	127,716	84,178	89,308	132,981	74,238	86,444	67,852
Examinations:											
Medical	76,571	297	6,093	2,564	9,846	3,515	9,586	2,970	4,220	5,240	4,469
Urological	74,715	97	7,095	2,417	8,702	22,877	1,890	3,279	2,249	3,259	1,703
Eye, ear, nose, and throat	23,533	112	3,242	2,042	2,360	3,691	606	4,319	1,300	811	429
Dental	28,546	287	3,368	876	4,488	1,812	968	1,485	1,369	3,309	1,939
Psychiatric	29,662	256	1,979	1,216	8,774	2,793	709	1,929	1,331	29	739
Psychological	21,705	113	5,821	1,265	3,735	308	596	5,437	3,283		
Total	254,732	1,162	27,598	10,380	37,905	34,996	14,355	19,419	13,752	12,648	9,279
X-ray—number of films developed	15,134	332	1,743	1,681	1,347	1,896	745	751	589	602	22
X-ray—number of fluoroscopic examinations	2,977	4	198	336	659	233	54	36	11	341	
Laboratory service—number of tests, etc.	177,326	355	12,647	6,698	17,810	24,793	2,464	8,774	3,959	7,766	4,919
Pharmacy service—prescriptions dispensed	375,201	8,481	41,027	30,147	64,048	40,490	33,684	3,046	14,561	28,255	18,296

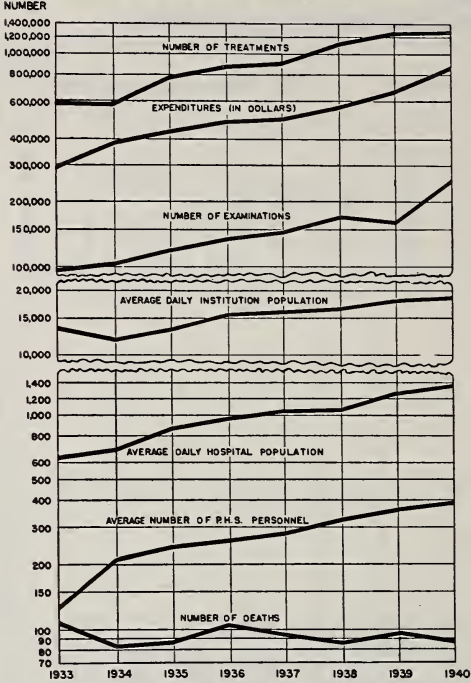
¹ Figures also cover Prison Camp, Du Pont, Wash.

tion, and deaths, compared with average inmate population, for each Federal ending June 30, 1940

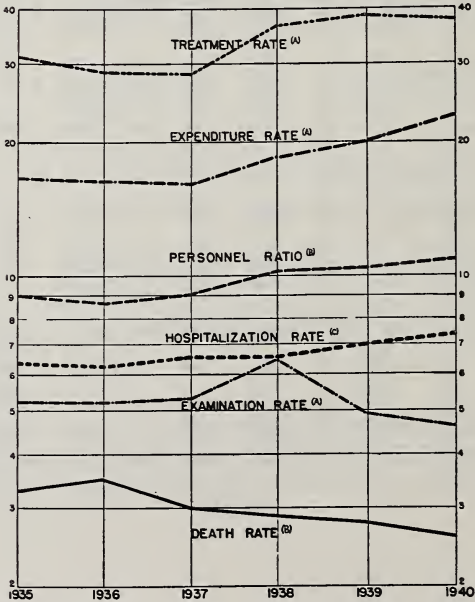
medical departments of the Federal penal and correctional institutions)

Medical Center	Prison camps				Correctional institutions					Detention headquarters		National Training School for Boys, D. C.
Springfield, Mo.	Kooskia, Idaho	Mill Point, W. Va.	Montgomery, Ala.	Tucson, Ariz.	El Paso, Tex.	Milan, Mich.	Sandstone, Minn.	San Pedro, Calif.	Tallahassee, Fla.	New Orleans, La.	New York, N. Y.	
10			1		2	2	2	2	1	1	4	2
7	3	3	2	4	5	4	1	6	2	2	2	
2						1	1	1	1	1	1	1
	1	1	1	1	1	1						
141	1	1	1	1	3	3	2	3	2	3	3	4
160	5	5	5	6	11	11	6	12	6	7	10	7
34	1	1	3	1	11	10	13	2	2	7	4	5
692		6	16	32	26	21	28	41	20	18	32	30
796	146	150	217	149	509	587	332	488	257	278	282	345
658.8	.1	.4	5.6	7.7	24.3	12.6	14.4	34.5	5.8	11.1	8.5	7.9
1,041	12	22	15	20	739	358	151	511	51	150	111	48
241,124	49	164	2,036	2,810	8,882	4,614	5,288	12,626	2,124	4,057	3,103	2,874
28						2	3	4	1	1	4	
2,753	2,785	3,322	6,739	9,159	36,708	32,650	7,303	37,716	18,121	17,842	21,694	5,630
3,508	945	2,614	1,203	877	3,236	2,412	1,678	5,936	3,354	1,310	871	1,082
7,090	388	111	3,867	900	8,195	3,676	9,192	6,365	4,740	6,716	2,366	707
1,502	1,137	1,044	853	42	5,155	4,915	828	9,766	1,467	2,306	1,962	1,233
6,806	690	279	1,025	182	1,028	8,338	3,943	4,423	3,479	6,060	358	5,023
2,771					137	578	125	2,320		3	53	80
27,605	397	247	159	27	2,363	2,388	1,083	8,838	2,194	1,384	1,588	98
103		31		11		78						
52,138	6,342	7,648	13,846	11,198	56,832	55,035	24,152	75,369	33,355	35,523	28,892	13,853
3,576	526	689	1,331	152	3,542	3,002	718	4,615	1,717	2,593	4,515	795
3,076	161	463	1,486	159	4,983	2,622	1,405	2,052	1,074	1,653	1,446	567
1,262	496	193		13	963	686	36	275	83	176	438	
1,678	177	91	604	61	335	792	931	962	962	1,162	198	692
3,445					38	1,105	570	4,039	5	20	133	552
390							173	198		2	178	206
13,427	1,360	1,436	3,421	385	9,861	8,207	3,833	12,141	3,841	5,606	6,908	2,812
2,780	14	17	24	46	421	558	298	274	73	220	701	
747	2	45	3			62	96	73	16	7	54	
54,402	37	232	522	389	9,391	4,298	2,401	5,443	705	3,573	3,622	2,126
8,663	5,293	4,592	5,676		13,442	25,609	8,267	4,145	8,755	8,200	524	

UNITED STATES PUBLIC HEALTH SERVICE
WORK IN FEDERAL PENAL AND CORRECTIONAL INSTITUTIONS
BY FISCAL YEARS ENDING JUNE 30, 1933 TO 1940



UNITED STATES PUBLIC HEALTH SERVICE
WORK IN FEDERAL PENAL AND CORRECTIONAL INSTITUTIONS
BY FISCAL YEARS ENDING JUNE 30, 1935 TO 1940



(A) Ratios of total treatments, expenditures, and examinations to total sentenced inmates in institutions during year.
(B) Number of personnel and of deaths per 1,000 sentenced inmates in institutions during year.
(C) Average number of inmates in hospital, per 100 inmates in average total institution population.

STUDIES AND INVESTIGATIONS OF THE CAUSES, PREVALENCE, AND MEANS FOR THE PREVENTION AND TREATMENT OF MENTAL DISEASE

The psychiatric diagnostic service for Federal courts was continued during the year at the United States district courts located at Atlanta, Baltimore, Boston, Denver, Detroit, Kansas City, Mo., Minneapolis, New York City, Philadelphia, and Pittsburgh. Of the 114 persons examined during the period in question 8 were hospitalized for further observation. Lack of funds prevented further expansion of this activity.

On July 1, 1939, a Section on Mental Health Methods was established in the Division to take over the work of the Mental Hospital Survey Committee. This Committee, composed of representatives of national and international medical and psychiatric organizations and the Public Health Service, had been engaged in a 3-year program of surveying mental hospitals to determine the adequacy of facilities for the care of the mentally ill in the United States and to bring about improvements where indicated, in order to raise the general standards for such care. The studies made during this period indicated the great need for improvement in the care of the mentally ill throughout the country, and while some of the States were responsive and put into effect recommendations made, the task was far from completed. Since this work has such a vital bearing on raising the standards of care and treatment of the mentally ill, it is being continued by the Service. The Committee is no longer actively engaged in it, but continues to act in an advisory capacity to the Public Health Service.

The Section on Mental Health Methods has continued the survey work and during the past year has surveyed institutions for the care of the mentally ill in Minnesota, Kentucky, Indiana, Missouri, Louisiana, and Maine; making a total of 24 mental hospitals, 4 schools for mental defectives, and 2 institutions for convulsive disorders. Of the 24 mental hospitals mentioned above, 8 were resurveyed. In addition to the institutions studied, 19 other institutions were visited to note changes and betterments in practice or because advice was requested on additional points, or for other special reasons. Of the institutions visited, 6 were general hospitals which maintained psychiatric wards.

In addition to the survey work the Section has also engaged in activities of an informational and educational nature concerning administration, personnel, equipment, policy, and treatment in mental hospitals.

Field studies in mental hygiene carried on during the year in Fayette County, Ky., will be discontinued early in the year 1941 and the uncompleted part of its program will be completed in the Section on Mental Health Methods of the Division of Mental Hygiene by personnel that will be transferred to this Section. The original plan of investigation and demonstration based on clinical and statistical studies of a single community was replaced during the year by a plan which contemplated the establishment of a Bureau of Mental Health in the Kentucky State Health Department and the development of an analytic study of the socio-economic relationships of mental disorder on a State-wide basis.

The proposed Bureau of Mental Health in the Kentucky State Health Department was based on the establishment of three fundamental services:

1. It was proposed to establish a case finding and reporting service for committable mental disorders to function on a State-wide basis.
2. It was proposed to establish an investigative service for the study of committable mental disorders on a county basis.
3. It was proposed to establish an educational, case finding, and guidance service in relation to noncommittable mental disorders on a county basis.

The proposed analytical study of the socio-economic relationships was based on two fundamental types of investigation:

1. It was planned to statistically relate mental disorders to selected socio-economic indices on the basis of mental hospital commitment data.
2. It was planned to relate mental disorder to socio-economic indices on the basis of the incidence of mental disorder as determined by reports from county health departments.

The above plan was followed throughout the fiscal year 1940.

Early in the year the statistical study of mental hospital commitment data which had been obtained through the State Welfare Department for approximately 80 socio-economic indices was completed. This study, recorded in the form of maps, charts, and tables, is now being used as the basis of a special article to be submitted for publication.

Viewed in the light of its original objectives, Field Studies in Mental Hygiene has achieved its main purposes—the establishment of a method for the determination of the incidence of mental disorder, the establishment of methods for the investigation of the combined factors responsible for the occurrence of mental disorder, and the definition of the role of public health in the field of mental disorder. It has also pointed out many of the obstacles which prevent a rapid solution of existing mental health problems and it has described and demonstrated a method for the integration of mental and physical health services by health departments.

In connection with the studies relating to mental diseases, the following articles were published in both Service and outside publications: An Epidemiological Approach to the Prevention of Chronic Physical, Mental, and Social Illness, by L. M. Rogers; Laws Pertaining to the Admission of Patients to Mental Hospitals Throughout the United States, by G. A. Kempf; Regional Differences in the Care of Mental Defect and Epilepsy, by Joseph Zubin; and Trends in the Activities of Mental Hospitals, by G. A. Kempf and S. W. Hamilton. A number of other articles dealing with various phases of this work have been approved for publication.

DIVISION OF PERSONNEL AND ACCOUNTS

Assistant Surgeon General PAUL M. STEWART in charge

The Personnel and Accounts Division supervises all operations of the Service relating to personnel, finances, and the maintenance of property records. The organization of the Division has remained unchanged during the year. Through a personnel section, a finance section, and a property-record section, all matters relating to appointments, separations, and other changes in status of personnel, estimates of appropriations, allotments, and encumbrances, records of expenditures, including administrative audit, and all records of nonexpendable property are administered under the supervision of the Assistant Surgeon General in charge of the Division.

PERSONNEL

COMMISSIONED OFFICERS

The following table shows the commissioned officers in the Regular Corps of the Public Health Service on July 1, 1939, and July 1, 1940:

Grade	July 1, 1939		July 1, 1940	
	Active	Waiting orders	Active	Waiting orders
Surgeon General.....	1	1	1	1
Assistant Surgeon General.....	8		8	
Medical director.....	27	32	34	33
Sanitary engineer director.....	1			1
Pharmacologist director.....	1		1	
Senior surgeon.....	50	7	45	8
Senior dental surgeon.....			6	
Senior sanitary engineer.....	11		11	
Surgeon.....	59	15	65	13
Dental surgeon.....	18		12	
Sanitary engineer.....	8		8	
Passed assistant surgeon.....	135	5	141	6
Passed assistant dental surgeon.....	27	2	29	2
Passed assistant sanitary engineer.....	5		5	
Passed assistant pharmacist.....	5	3	4	4
Assistant surgeon.....	99		110	
Assistant dental surgeon.....	5	1	2	1
Assistant pharmacist.....		1		1
Total.....	460	67	482	70

CHANGES DURING THE YEAR

	Promoted to next grade	New appointments	Retired	Deaths	Resignations	Separations
Medical director.....			5	3		
Senior surgeon.....	12		1			
Surgeon.....	8			2		
Dental surgeon.....	6					
Passed assistant surgeon.....	13		1		4	
Passed assistant dental surgeon.....					1	
Passed assistant pharmacist.....			1			
Assistant surgeon.....	24	41			3	3
Assistant dental surgeon.....	3					
Total.....	66	41	8	5	8	3

SPECIAL DETAILS TO OTHER ACTIVITIES

	Medical director	Senior surgeon	Surgeon	Passed assistant surgeon	Passed assistant dental surgeon	Assistant surgeon
Employees' Compensation Commission.....			3	1		
Pan American Sanitary Bureau.....		1	1	1		
Bureau of Indian Affairs.....	3	1	4	1		
U. S. Coast Guard.....		1	1	4	2	8
Farm Security Administration.....		1	1			
Social Security Board.....			1			
Federal Trade Commission.....	1					
Total.....	4	4	11	7	2	8

RESERVE OFFICERS (ACTIVE DUTY)

Grade	July 1, 1939	July 1, 1940
Surgeon.....	7	8
Sanitary engineer.....	1	1
Passed assistant surgeon.....	21	26
Passed assistant dental surgeon.....	2	5
Assistant surgeon.....	53	68
Assistant dental surgeon.....	18	26
Assistant sanitary engineer.....		11
Total.....	102	145

ACTING ASSISTANT SURGEONS

In marine hospitals.....	91	95
Immigration, relief and maritime, border, insular, and foreign quarantine work.....	438	439
Field investigations of public health.....	7	6
Coast Guard and Lighthouse services.....	126	125
Employees' Compensation Commission.....	4	3
Penal and correctional institutions.....	49	61
Antivenereal disease activities.....	37	33
Total.....	752	762

CONTRACT DENTAL SURGEONS

Grade	July 1, 1939	July 1, 1940
In marine hospitals.....	5	
Second and third class relief stations.....	37	41
Penal and correctional institutions.....	5	4
Coast Guard.....	7	6
Total.....	54	57

ATTENDING SPECIALISTS

Consultants in marine hospitals.....	310	339
Second and third class relief stations.....	51	44
Antivenereal disease activities.....	90	88
Penal and correctional institutions.....	131	136
Consultants in quarantine, immigration and scientific research activities.....	153	186
Total.....	735	793

INTERNES

Medical and dental internes.....	140	134
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PHARMACISTS AND ADMINISTRATIVE ASSISTANTS (Civil Service)

Pharmacist.....	15	18
Administrative assistant.....	73	73

EPIDEMIOLOGISTS

During the year the number of assistant collaborating epidemiologists was increased from 4,791 to 5,042. These employees are health officers or employees of State or local boards of health, who receive only nominal compensation from the Federal Government and who furnish the Service with reports of communicable diseases received by State or local health organizations. The number of collaborating epidemiologists on duty on July 1, 1940, was 51. These appointees are officials of the State boards or departments of health and are on duty in the different States.

NATIONAL INSTITUTE OF HEALTH

The scientific staff of the National Institute of Health comprised 316 members, of whom 87 were commissioned officers and 229 other professional workers. The staff was assisted by 287 technicians and 353 other subordinates, making a total of 956.

In addition to the regular corps, 144 persons held appointments as consultants.

PROPERTY RECORDS

The Property Return Section accounted for all property of the Service and 364 property returns were audited during the year. A total of \$1,267.56 was turned in to "Miscellaneous Receipts" from sales of property.

Property surplus to the Public Health Service valued at \$42,803.51 was transferred to other Government departments. Surplus property of other Government departments valued at \$19,587.14 was taken over by the Public Health Service.

Property valued at \$39,937.40 has been transferred from Service stations where it was surplus to other stations where it could be used. By exchange allowances on old typewriters and adding machines turned in, \$4,117.46 was saved.

ACCOUNTS SECTION

The Accounts Section of the Division of Personnel and Accounts conducts all bookkeeping and accounting in connection with the expenditure of Public Health Service appropriations. This includes also accounts of miscellaneous collections, allotments, records of encumbrances, cost accounting, and the administrative audit. A statement of appropriations, expenditures, and balances, with miscellaneous receipts, is published as an appendix to this report.

PERSONNEL STATEMENT

The accompanying tabular statement shows the personnel of the Service as of July 1, 1940. Of the 14,685 employees shown in the table, 5,093 listed as collaborating epidemiologists and assistant collaborating epidemiologists receive only nominal compensation. They are mainly officers or employees of State and local health organizations who collaborate in the collection of morbidity statistics by furnishing the figures collected by those organizations relating to cases of communicable diseases. The personnel statement also includes all part-time employees, those employed on a per diem basis, and those whose compensation is on a fee basis.

[illegible]

Consolidated quarterly personnel report for quarter ending July 1, 1940—Continued

U. S. Public Health Service	Regular corps			Reserve corps			Noncommissioned personnel																	Totals						
	Surgeon General	Assistant Surgeon General	Surgeon	Passed assistant surgeon	Assistant surgeon	Acting assistant surgeon	Attending specialist and consultant	Contract dental surgeons	Interns	Pharmacist	Administrative assistant	Assistant collaborating epidemiologists and collaborating epidemiologists	Druggist	Aide (P. T. and O. T.)	Dietitian	Nurse	Scientific personnel and hospital laboratorians	Pilot	Marine engineer	Sanitary Inspector and fumigator	Clerk	Departmental personnel (regular)	Temporary emergency workers	Attendant	All other field employees	Commissioned officers (regular and reserve)	Noncommissioned employees	Subtotal (or station total)	Grand total (or division total)	
FIELD—continued																														
Division of Sanitary Reports and Statistics.....	1	4	24	9			33	88			2	5,093	1			17	28	8				7			13	35	38	5,111	5,111	5,111
Division of Venereal Diseases.....																														
Division of Mental Hygiene.....																														
Alcatraz Island, Calif.....							1	1																						
Alderson, W. Va.....							1	6																						
Atlanta, Ga.....							1	3																						
Chillicothe, Ohio.....							1	3																						
El Reno, Okla.....							1	4																						
Fort Leavenworth, Kans.....							1	4																						
La Tuna, Tex.....							1	4																						
Leavenworth, Kans.....							1	3																						
Lexington, Ky.....							1	3																						
Lewisburg, Pa.....							1	5																						
McNeil Is. Steilacoom, Wash.....							1	1																						
Milan, Mich.....							3	1																						
New Orleans, La.....							1	4																						
Petersburg, Va.....							1	3																						
Springfield, Mo.....							1	4																						
Tucson, Ariz.....							1	2																						
All other activities.....	1	2	5	9			16	76	3	2	4		1	1	2	10	17				30				86	78	27	326	353	

U. S. Public Health Service

CHIEF CLERK'S OFFICE

DANIEL MASTERSON, Chief Clerk and Administrative Officer

DEPARTMENTAL PERSONNEL

The civilian departmental force consisted of 261 employees on July 1, 1939. A number of positions were added during the year, 4 of which were allowed in the 1940 Appropriation Act for Salaries, Office of the Surgeon General. As a result of the transfer of certain functions of the Procurement Division to the Public Health Service, 13 positions were established, the incumbents being paid from Pay of Personnel and Maintenance of Hospitals. Two additional positions were created on the regular roll to take care of certain functions transferred from the Division of Printing and several were established on other rolls of the Service. In accordance with Reorganization Plan No. 5, two minor mechanic (chauffeur) positions were transferred to the Post Office Department for assignment to the Government Messenger Service. A total of 291 employees were on duty at administrative headquarters on June 30, 1940. During the year, 32 probational appointments were made, and there were 6 reinstatements of former Government employees, 19 appointments by transfer from Public Health Service field stations or other Government agencies, 5 retirements, 3 resignations, 17 transfers to field stations or other Government agencies, and 1 death. During the year the pressure of work necessitated the employment of 11 temporary employees. The services of all but two of these, whose appointments had not been completed, were terminated by the end of the fiscal year.

The average salary of departmental employees on July 1, 1939, was \$1,887.66, and on June 30, 1940, it was \$1,824.88. This reduction resulted, in part, from the limitations of section 10 (b) of the act of April 3, 1939 (Government Reorganization Act) providing that neither increases in grade nor salary be made during the fiscal year 1940. As a result, it was necessary for a number of employees to serve a part of the year in more responsible capacities without receiving the compensation regularly paid the incumbents of such positions. The salaries of the 291 departmental employees were paid from the following appropriations: 182 from Salaries, Office of the Surgeon General; 44 from Diseases and Sanitation Investigations; 22 from Expenses, Division of Venereal Diseases; 22 from Expenses, Division of Mental Hygiene; 4 from Maintenance, National Cancer Institute; 4 from Medical and Hospital Service, Penal Institutions; and 13 from Pay of Personnel and Maintenance of Hospitals.

Sick leave for the year averaged 8.17 days per employee as compared to 8.05 for the preceding year. The record for punctuality on the part of employees was substantially perfect, being less than one case per employee.

Mr. Philip H. Mattingly, principal clerk, grade CAF-6, after having served the Government continuously for over 50 years, retired under the provisions of section 4 of the Civil Service Retirement Act, on August 1, 1939. Mr. Harry A. Earp, clerk, grade CAF-4, Mrs. Cara P. Buchanan, junior clerk, grade CAF-2, Mrs. Mary L. Benner, clerk, grade CAF-4, and Mr. Guss Wills, minor mechanic (chauffeur), grade CU-3, were retired because of physical disability.

Mr. John E. Goss, grade CU-3, an employee of the Public Health Service since August 16, 1920, died March 25, 1940.

For several years the regular departmental force has been supplemented by a number of emergency employees who were employed outside the scope of the Civil Service, but in accordance with executive Order 6746 of June 21, 1934. During the fiscal year 1940, a majority of these employees were given a temporary Civil Service status pending classification, and it is expected that their status will be made permanent early in 1941.

PRINTING AND BINDING

On July 1, 1939, the Treasury Department transferred to the Federal Security Agency the sum of \$67,650 for printing and binding for the Public Health Service. This sum was incommensurate with the actual printing and binding needs, which have continued to increase as the special functions imposed upon the Service under the Social Security Act, the National Cancer Institute Act, and the Venereal Disease Control Act have been put into effect. Consequently, it became necessary to augment the general printing fund by \$59,204 from other Public Health Service appropriations available for printing, making a total expenditure of approximately \$126,854 for the year ended June 30, 1940.

OFFICE QUARTERS, SUPPLIES, AND EQUIPMENT

The lack of sufficient office space in the administration building in Washington is still a major problem, despite the fact that certain offices were moved from this building to other quarters during the year. During the year two space reallocations were carried out involving 10,775 square feet, or 28.5 percent of the total available space.

The landscaping of the grounds surrounding the building, which was begun during the preceding fiscal year, has been completed and has added greatly to the exterior appearance of the structure.

For stationery supplies for headquarters and the entire field service, the sum of \$33,655 was expended from the regular stationery appropriation, and \$16,245 from the Diseases and Sanitation Investigations appropriation. For equipment, office supplies, and services at administration headquarters, \$14,985 was expended from the Contingent Appropriation and \$27,519 from the Diseases and Sanitation Investigations appropriation.

Pursuant to the President's Reorganization Plan No. 1, transferring the Public Health Service from the Treasury Department to the Federal Security Agency effective July 1, 1939, portions of the stationery appropriation of the Treasury Department and of the Contingent Expenses Appropriation of the Treasury Department were transferred to the Public Health Service for direct supervision. This

transfer of funds, together with the return of certain purchasing functions from the Procurement Division of the Treasury Department, has resulted in definite advantages in speeding action on requisitions and in reducing delays in delivery of equipment and supplies. There were also transferred from the Treasury Department the functions involving the storage and shipment of blank forms, blank books, and similar matter. During the fiscal year 153,075 pounds of this matter were shipped to field stations in response to 1,650 requisitions at a transportation cost of \$1,478. In accordance with an order of the Administrator of the Federal Security Agency, the Photographic and Duplicating Units of the Public Health Service in Washington were transferred and consolidated with other similar units of the Agency for operation under one supervision, effective February 1, 1940.

LIBRARY

The library at administrative headquarters contains approximately 16,470 bound volumes and a collection of pamphlets numbering 9,150. During the fiscal year 595 bound volumes were added, 67 of which were purchased, while the remaining volumes included books received as gifts, bound volumes of periodicals, and Federal and State documents. About 700 additional pamphlets were received.

Two hundred and seventy-five serial publications were received and routed to the persons interested. Of this number, 36 were paid subscriptions to medical and health periodicals; the others were received gratuitously or by exchange. Approximately 155 bulletins were contributed by State, city, and foreign welfare and health departments. Books circulated totaled 5,949, including 101 sent into the field. Of the total circulated, 5,410 were Public Health Service books and 539 were borrowed from outside libraries. Readers visiting the library numbered 3,856, and there were 1,334 telephone requests.

MAIL AND RECORDS

The following table shows the number of pieces of incoming and outgoing mail and telegrams, and also the quantity of correspondence classified, recorded, and filed:

Incoming mail	594, 897	
Incoming telegrams	7, 683	
Total incoming correspondence		602, 580
Outgoing mail	496, 264	
Outgoing telegrams	4, 956	
Total outgoing correspondence		501, 220
Grand total		1, 103, 800
Mail classified and recorded		144, 976
Mail classified only		142, 985
Correspondence filed		238, 872

EMPLOYEE ACTIVITIES

The Public Health Service Federal Credit Union, operating under the supervision of the Farm Credit Administration, continued to grow during the year. As of June 30, 1940, there were 286 active

members. Total assets of the credit union have reached \$29,396.49, of which \$13,500.00 is invested in Federal savings and loan associations, and most of the remainder is utilized to make loans to members. Total savings deposits of members amounted to \$27,704.47. During the year 119 loans totaling \$13,095.28 were made, making a grand total of 827 loans, aggregating \$74,148.06, since organization in 1935. For the calendar year 1939, a dividend of 5½ percent was declared.

The Public Health Service Relief Association made 16 loans totaling \$1,655.50 during the year. An outright gift of cash was made to an employee who was forced to leave the Service on account of physical disability. As of June 30, 1940, total assets of the association were \$5,131.49.

The activities of the Recreation Association have continued to develop and have proved beneficial in improving the morale of the personnel as well as in the actual recreational advantages. During the year an active and successful Gun Club was organized and the Book Club now possesses a circulating library of substantial size

APPENDIX A

FINANCIAL STATEMENT

The following is a statement of expenditures from appropriations of the Public Health Service for the fiscal year 1940:

Appropriation	Appropriated	Received by transfer	Reserve	Available for obligation	Expenditures		Unobligated balance
					Direct obligations	Transfer to other appropriations	
Salaries, office of Surgeon General.....	323,340	¹ 13,520	9,200	327,660	326,984	-----	676
Pay, etc., commissioned officers.....	1,959,800	² 364,576	-----	2,324,376	2,321,885	-----	2,491
Pay of acting assistant surgeons.....	320,000	-----	-----	320,000	319,782	-----	218
Pay of other employees.....	1,000,000	-----	-----	1,000,000	996,659	-----	3,341
Freight, transportation, etc.....	25,000	³ 10,000	-----	35,000	33,724	-----	1,276
Maintenance National Institute of Health.....	137,000	-----	-----	137,000	136,589	-----	411
Pay of personnel and maintenance of hospitals.....	6,719,000	⁴ 2,235,769	5,300	8,949,469	8,788,204	⁵ 20,200	141,065
Quarantine service.....	287,980	-----	600	287,380	283,753	-----	3,627
Preventing spread of epidemic diseases.....	305,000	-----	14,400	290,600	280,695	-----	9,905
Interstate quarantine service.....	36,500	-----	-----	36,500	36,119	-----	381
Control of biologic products.....	53,000	-----	-----	53,000	52,695	-----	305
Expenses:							
Division of Venereal Disease.....	5,000,000	⁶ 39,414	1,400	5,038,014	4,740,989	⁷ 96,800	⁸ 200,225
Division of Mental Hygiene.....	1,217,700	-----	2,700	1,215,000	1,179,791	⁹ 27,000	8,209
Diseases and sanitation investigations.....	1,640,000	¹⁰ 8,000	-----	1,648,000	1,438,282	¹¹ 189,156	20,562
Maintenance, National Cancer Institute.....	570,000	-----	1,400	568,600	558,990	¹² 3,000	6,610
Working capital fund.....	-----	¹³ 186,417	-----	186,417	126,467	-----	59,950
Appreciation of foreign currency.....	-----	¹⁴ 30,000	-----	30,000	26,658	-----	3,342
Contingent expenses.....	-----	¹⁵ 14,985	-----	14,985	14,885	-----	100
Printing and binding.....	-----	¹⁵ 67,650	-----	67,650	66,560	-----	1,090
Stationery.....	-----	¹⁵ 33,655	-----	33,655	33,419	-----	236
Total.....	19,594,320	3,003,986	35,000	22,563,306	21,763,130	336,156	464,020
Grants to States.....	9,500,000	222,821	-----	9,722,821	9,500,706	-----	¹⁶ 222,115

¹ Transferred from Treasury Department, \$13,520.

² \$68,429 from Justice Department; \$13,991, Employees Compensation Commission; \$189,156, diseases and sanitation investigations, Public Health Service, 1940; \$93,000, expenses, Division of Venereal Diseases, Public Health Service, 1940.

³ From Department of Justice, \$10,000.

⁴ \$830,344, Veterans' Administration; \$226,386, hospital care of members of Civilian Conservation Corps; \$1,042,504, hospitalization employees W. P. A., Compensation Commission; \$1,562, Allied soldiers; \$4,031, U. S. Army; \$9,878, U. S. Navy; \$17,468, Coast Guard dependents; \$1,515, Coast and Geodetic Survey dependents; \$2,850, salaries, accounts and deposits; \$26,747, Employees Compensation Commission; \$3,600, Farm Credit; \$920, Interior Department; \$4,773, Labor Department; \$1,920, Labor, Wages, and Hours; \$1,120, Lighthouse Service; \$32,376, Maritime Service; \$1,800, Securities and Exchange; \$1,276, Army laundry; \$313, utilities (California); \$5,460, medical supplies; \$9,465, dental supplies; \$821, Post Office Department (travel); \$2,640, supplies, Fort Worth; \$6,000, Department of Justice.

⁵ Transferred to Federal Security Agency administrative expenses.

⁶ Transferred from fiscal year 1939.

⁷ \$93,000 to pay, etc., commissioned officers, Public Health Service, 1940; \$3,800 to Public Buildings Administration.

⁸ \$190,852 transferred to 1941.

⁹ Transferred to working capital fund, Public Health Service, 1940.

¹⁰ Transferred from Navy Department.

¹¹ Transferred to pay, etc., commissioned officers, Public Health Service, 1940.

¹² Transferred to Bureau of Standards, Commerce Department.

¹³ \$27,000 from expenses, mental hygiene, Public Health Service, 1940; \$53,252 balance July 1, 1939; \$106,165 earnings.

¹⁴ \$30,000, Public Health Service allotment from Secretary of Treasury.

¹⁵ Transferred from Treasury Department.

¹⁶ Transferred to 1941.

FUNDS MADE AVAILABLE FROM OTHER SOURCES

	Available	Transfers from appropriations	Total available	Direct	Transfer to appropriations	Balance
Medical and hospital service.....	599,302			596,563	-----	2,739
Mosquito control, District of Columbia.....	1,500			1,495	-----	5
Maintenance and improvement of rivers and harbors.....	214,000			162,538	145,000	6,462
National training school for boys.....	10,000			9,986	-----	14
Emergency relief.....	300,000			285,441	-----	14,559
Total.....	1,124,802			1,056,023	45,000	23,779

¹ \$45,000 transferred to 1941.

MISCELLANEOUS RECEIPTS

Source	Amount
General fund receipts:	
Quarantine charges.....	\$191,420.99
Hospital charges and expenses.....	66,605.80
Sale of subsistence.....	16,538.32
Sale of occupational therapy products.....	1,010.52
Sale of obsolete, condemned, and unserviceable equipment.....	1,770.12
Rents.....	7,757.80
Reimbursement for Government property lost or damaged.....	640.06
Telephone commissions.....	2,915.35
Sale of refuse, etc.....	4,613.71
Sale of livestock and livestock products.....	1,770.89
Other revenues.....	774.62
Quarters, subsistence, and laundry.....	2,460.58
Total.....	298,278.76
Trust fund receipts:	
Sale of effects of deceased patients.....	2,885.99
Inmates' funds.....	62,151.12
Grand total.....	363,315.87

QUARANTINE SERVICE—EXPENDITURES BY STATIONS

Name of station	Pay of officers and employees	Maintenance	Total
Baltimore, Md.....	\$42,237.16	\$18,551.45	\$60,788.61
Biscayne Bay (Miami), Fla.....	53,025.50	16,613.75	69,639.25
Boca Grande, Fla.....	1,075.00	125.00	1,200.00
Boston (Gallops Island), Mass.....	39,142.97	12,211.64	51,354.61
Brownsville, Tex.....	11,799.71	8,714.04	20,513.75
Brunswick, Ga.....	900.00	-----	900.00
Cape Fear (Southport), N. C.....	3,843.28	254.13	4,097.41
Charleston, S. C.....	20,406.35	6,269.49	26,675.84
Columbia River (Astoria), Oreg.....	165.00	127.90	292.90
Corpus Christi, Tex.....	2,305.00	-----	2,305.00
Del Rio, Tex.....	2,252.00	703.78	2,955.78
Eagle Pass, Tex.....	1,984.00	506.65	2,490.65
El Paso, Tex.....	29,718.35	2,801.30	32,519.65
Eureka, Calif.....	1,025.00	26.75	1,051.75
Freeport, Tex.....	445.00	-----	445.00
Galveston, Tex.....	22,992.37	6,105.62	29,097.99
Gulfport, Miss.....	8,433.25	2,303.37	10,736.62
Hidalgo, Tex.....	7,767.64	609.64	8,377.28
Key West, Fla.....	3,600.00	76.96	3,676.96
Laredo, Tex.....	20,960.92	1,334.55	22,295.47
Lewes, Del.....	599.96	-----	599.96
Mercedes, Tex.....	2,430.00	770.52	3,200.52
Mobile, Ala.....	23,838.55	14,764.57	38,603.12
Naco, Ariz.....	1,153.45	48.00	1,201.45
New Orleans, La.....	61,871.62	11,658.10	73,529.72
Newport, R. I.....	-----	25.00	25.00
New York (Rosebank), N. Y.....	175,911.98	35,573.30	211,485.28
Nogales, Ariz.....	4,512.50	119.23	4,631.73
Norfolk (Fort Monroe), Va.....	22,019.36	8,272.53	30,291.89

QUARANTINE SERVICE—EXPENDITURES BY STATIONS—Continued

Name of station	Pay of officers and employees	Maintenance	Total
Pascagoula, Miss.....	1,200.00		1,200.00
Pensacola, Fla.....	4,627.82	545.18	5,173.00
Perth Amboy, N. J.....	1,960.50	618.79	2,579.29
Philadelphia, Pa.....	37,190.57	47,833.66	85,024.23
Portland, Maine.....	6,164.68	624.29	6,788.97
Portland, Oreg.....	11,761.95	1,374.74	13,136.69
Port Townsend, Wash.....	1,030.00		1,030.00
Presidio, Tex.....	3,099.78	765.50	3,865.28
Providence, R. I.....	766.64	375.00	1,141.64
Rio Grande, Tex.....	1,680.00	76.60	1,756.60
Roma, Tex.....	2,720.00	600.00	3,320.00
Sabine, Tex.....	17,902.74	2,921.28	20,824.02
St. Andrews (Panama City) Fla.....	300.00	48.00	348.00
St. George Sound, Fla.....	300.00		300.00
St. Johns River (Jacksonville) Fla.....	7,352.52	3,015.67	10,368.19
San Diego (Point Loma) Calif.....	9,438.57	2,031.39	11,469.96
San Francisco, Calif.....	42,454.76	7,883.85	50,338.61
San Pedro, Calif.....	46,302.50	6,964.59	53,267.09
Savannah, Ga.....	5,400.00	424.77	5,824.77
Seattle, Wash.....	11,952.80	571.77	12,524.57
Tampa, Fla.....	19,737.50	4,727.91	24,465.41
Zapata, Tex.....	1,740.00	360.00	2,100.00
Freight and miscellaneous.....		31,103.16	31,103.16
Total.....	801,499.25	261,433.42	1,062,932.67
INSULAR QUARANTINE STATIONS			
Hawaii.....	28,788.06	8,295.52	37,083.58
Philippine Islands.....	23,050.90		23,050.90
Puerto Rico.....	47,240.28	5,739.89	52,980.17
Virgin Islands.....	8,899.92	119.20	9,019.12
Total.....	107,979.16	14,154.61	122,133.77
Grand total, all stations.....	909,478.41	275,588.03	1,185,066.44

APPENDIX B

76TH CONGRESS }
3d Session }

HOUSE OF REPRESENTATIVES

{ DOCUMENT
No. 604 }

PUBLIC HEALTH SERVICE

MESSAGE

FROM

THE PRESIDENT OF THE UNITED STATES

TRANSMITTING

RECOMMENDATION FOR ENABLING LEGISLATION AND AN APPROPRIATION FOR THE PUBLIC HEALTH SERVICE

JANUARY 30, 1940.—Referred to the Committee on Interstate and Foreign Commerce and ordered to be printed

To the Congress of the United States:

In my special message to the Congress on January 23, 1939, I expressed my concern over the inequalities that exist among the States as to health services and resources with which to furnish such services. With that message I transmitted the report and recommendations on national health prepared by the Interdepartmental Committee to Coordinate Health and Welfare Activities and recommended it for careful study by the Congress.

Conditions described a year ago are substantially unchanged today. There is still need for the Federal Government to participate in strengthening and increasing the health security of the Nation. Therefore, I am glad to know that a committee of the Congress has already begun a careful study of health legislation. It is my hope that such study will be continued actively during the present session, looking toward constructive action at the next. I have asked the Interdepartmental Committee to Coordinate Health and Welfare Activities to continue its studies.

In order that at least a beginning may be made I now propose for the consideration of the Congress a program for the construction of small hospitals in needy areas of the country, especially in rural areas, not now provided with them. Hospitals are essential to phy-

sicians in giving modern medical service to the people. In many areas present hospital facilities are almost nonexistent. The most elementary health needs are not being met.

The provision of hospitals in the areas to which I refer will greatly improve existing health services, attract competent doctors, and raise the standards of medical care in these communities. The new hospitals should serve the additional purpose of providing laboratory and other diagnostic facilities for the use of local physicians, as well as accommodations for local health departments.

The proposed hospitals should be built only where they are most needed; they should not be constructed in communities where public or private institutions are already available to the people in need of service even if these institutions are not up to the highest standards. To insure proper location and good standards of operation, approval of hospital construction projects should be given by the Surgeon General of the Public Health Service, with the advice of an advisory council consisting of outstanding medical and scientific authorities who are expert in matters relating to hospital and other public health services.

Projects proposed for consideration should be submitted by responsible public authorities and should include assurance that adequate maintenance will be provided. Approval of projects should be preceded by careful survey of existing local hospital facilities and needs. Standards for organization, staff, and continuing operation should be established by the Surgeon General, with the advice of the advisory council. A competent hospital staff and satisfactory standards of service should be required, including medical, surgical, and maternity service. When indicated, special provisions should be made for the care of the tuberculous. In many areas of the South, the present acute needs for the care of Negro patients should also be met.

I suggest that these hospitals be simple, functional structures, utilizing inexpensive materials and construction methods. The facilities of the Federal Works Agency should be utilized in the planning and execution of the hospital projects. Title to these institutions should be held by the Federal Government, but operation should be a local financial responsibility.

I recommend to the Congress that enabling legislation for this program be enacted and that a sum of between \$7,500,000 and \$10,000,000 be appropriated to the Public Health Service to inaugurate the program during the next fiscal year.

I am confident that even this limited undertaking will bring substantial returns in the saving of lives, rehabilitation of workers, and increased health and vigor of the people.

This suggestion is not a renewal of a public-works program through the method of grants in aid. The areas which I have in mind are areas so poor that they cannot raise their share of the cost of building and equipping a hospital. Yet I believe that many of such communities have enough public-spirited citizens with means, and enough citizens able to pay something for hospital treatment, to care for operating costs of a hospital, provided they do not have to pay for its original construction and equipment, or to pay annual interest and amortization on borrowed money. Treatment in such a

hospital would, of course, be available to men, women, and children who literally can afford to contribute little or nothing toward their treatment.

One of the important difficulties in such areas at the present time is that young doctors hesitate to practice general medicine or surgery because of the utter lack of hospital or laboratory facilities. One cannot blame them.

In such areas, also, costs of construction are generally low and many local materials can be used. It is my belief that with the assistance of the Work Projects Administration the cost of building and equipping a hundred-bed hospital can be kept down to between \$150,000 and \$200,000. This means that we could build 50 such hospitals for between \$7,500,000 and \$10,000,000.

This is not an ambitious project. This principle should not be extended to Government gifts to communities which are financially able to build their own hospitals. It is an experiment in the sense that the Nation will gain much experience by undertaking such a project.

At the very least it will save lives and improve health in those parts of the Nation which need this most and can afford it least.

FRANKLIN D. ROOSEVELT.

THE WHITE HOUSE, *January 30, 1940.*

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